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CONTENTS.

LEADING ARTICLES.

Obstacles to Accurate Statistics. <i>James H. Blodgett.</i>	1
Uniformity in Census Returns. <i>Josep Körösi.</i>	20
Cost of Production of Corn and Oats in Illinois in 1896. <i>Nathan A. Weston.</i>	30
Concentration in Pig-Iron and Coal Production. <i>E. W. Parker.</i>	69
The Annual Statistics of Manufactures in Massachusetts. <i>Horace G. Wadlin.</i>	77
Comparative Statistics of Railroad Rates. <i>Henry H. Swain.</i>	115
Remarks by <i>Henry C. Adams.</i>	122
" " <i>Arthur T. Hadley.</i>	124
" " <i>Emory R. Johnson.</i>	125
" " <i>H. T. Newcomb.</i>	127
" " <i>C. E. Prevey.</i>	180
Comparative Statistics of Railroad Service Under Dif- ferent Kinds of Control. <i>C. E. Prevey.</i>	183
Considerations in Gathering Forestry Statistics. <i>B. E. Fernow.</i>	155
Contributions to the Study of Wage Statistics. <i>Charles J. Bullock.</i>	187
A Year of State Deficits. <i>Worthington C. Ford.</i>	219
The Growth of the Population of Boston. <i>Frederick A. Bushée.</i>	239
Wage Statistics in Theory and Practice. <i>Roland P. Falkner.</i>	275
A Comparative Study of the Statistics of Agriculture of the Tenth and Eleventh Census. <i>N. I. Stone.</i>	290

Notes on Map Making and Graphic Representation.	
<i>W. Z. Ripley.</i>	313
The Portuguese Population in the United States. <i>Fred-</i>	
<i>eric L. Hoffman.</i>	327
Report of Uniform Financial School Reports.	337
Development of the Plan for a Census of the World.	
<i>John Howard Dynes.</i>	357

REVIEWS AND MISCELLANY.

Accounts, Analysis of.	395
Ages of Students Entering College.	56
Alcoholic Beverages, The Production and Consumption of	57
Athletics and Scholarship.	54
Berlin, The Workman in. <i>Alice Rhinehart Callaway.</i>	102
Births, Marriages and Deaths, Record of.	397
Birth Rate in England. <i>H. J. Gerling.</i>	151
" " " France. <i>H. J. Gerling.</i>	153
Boston Statistics Department, Monthly Bulletins of.	372
Classification of Causes of Death.	149
Census of 1900.	225
Charity Statistics, Study of.	386
College, Age of Students Entering.	56
Commerce, Finance and.	181
Colored Population, Migration of. <i>Frederick J. Brown.</i>	46
Correction, A Note of.	311
Criminal Statistics, Comparative.	59
Danish Statistics. <i>A. G. Keller.</i>	384
Deaf, Marriages of the. <i>S. W. A.</i>	353
Death, Classification of Causes of.	149
" Rates, Statement of.	111
Deaths in Child-Birth.	170
Divorces Granted in Michigan During the Year 1897. <i>Cressy</i>	
<i>L. Wilbur.</i>	146
Educational Statistics.	180
England, Birth Rate in. <i>H. J. Gerling.</i>	151

Contents.

v

Export Valuations, and Import. <i>F. C. Chappell.</i>	109
Family History, Pauper. <i>E. H. D.</i>	388
Finance and Commerce.	181
Gold in Actual Circulation.	107
Immigration, A Study in.	231
Import and Export Valuations. <i>F. C. Chappell.</i>	109
Interest, Rate in California.	350
Labor Inquiries.	178
Library of American Statistical Association.	169
Life Table. Massachusetts.	387
Marriages of the Deaf. <i>S. W. A.</i>	353
Massachusetts Life Table.	387
" Natality in. <i>S. W. A.</i>	48
Memorandum on Efforts to Determine the Area and Population of the Philippine Islands. <i>W. F. Willcox.</i>	346
Michigan, Divorces Granted in, During the Year 1897. <i>Cressy</i> <i>L. Wilbur.</i>	146
Migration of Colored Population. <i>Frederick J. Brown.</i>	46
Miscellaneous.	184
Monthly Bulletin of the Statistics Department of Boston. <i>H. H.</i> <i>Cook.</i>	372
Mortality of Negroes. <i>F. J. B.</i>	52
Natality. <i>C.-E. A. Winslow.</i>	378
" in Massachusetts. <i>S. W. A.</i>	48
Negroes, Mortality of. <i>F. J. B.</i>	52
New Zealand, Statistics of Infirmities in.	50
Notes.	63, 233, 390
Operation of Poll Tax in Iowa.	53
Pauper Family Histories. <i>E. H. D.</i>	383
Philippine Islands, Memorandum of Efforts to Determine the Area and Population of the. <i>W. F. Willcox.</i>	346
Poll Tax, Operation of, in Iowa.	53
Price Index, Sauerbeck's.	66
Proportion of the Sexes.	51
Rates of Interest in California, Notes Concerning the. <i>Carl C.</i> <i>Plehn.</i>	350
Record of Births, Marriages and Deaths.	397

Sauerbeck's Price Index.	66
Scholarship, Athletics and.	54
Sexes, Proportion of.	51
Spain, Vitality Statistics of the War with.	229
State Publications.	390
Statistics Department of Boston, Monthly Bulletin of. <i>H. H.</i>	
<i>Cook.</i>	372
Statistics Examination:	396
" of Immigration. <i>Prescott F. Hall.</i>	381
" of Infirmitities in New Zealand.	50
" of Trade Unions.	62
Trade of United States. <i>Worthington C. Ford.</i>	377
" Unions, Statistics of.	62
Treasury Estimate for 1900. Note on the. <i>Worthington C. Ford.</i>	173
United States, Trade of. <i>Worthington C. Ford.</i>	377
Vital Statistics, Notes on.	176
" " Notes on. <i>C.-E. A. Winslow.</i>	388
" " of the War with Spain.	229
" " of West Indies. <i>Cressy L. Wilbur.</i>	51
West Indies, Vital Statistics of. <i>Cressy L. Wilbur.</i>	51
Workman in Berlin. <i>Alice Rhinehart Callaway.</i>	102

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OBSTACLES TO ACCURATE STATISTICS.*

BY JAMES H. BLODGETT.

In statistical work we should be able to presume upon honesty, fidelity, and diligence. It adds something, indeed, to the embarrassments of statistical research that checks must be devised to guard against dishonesty, negligence, and carelessness, as well as against accident.† It is not, however, the present intention to dwell upon what may be called details of administration, but rather to speak of matters which must be settled in general plans of work.

It might be supposed that an enumeration of the people was a very simple thing, involving merely a counting of persons in a given area. In point of fact, however, no census of the United States has yet been taken which did not allow a considerable range of dates for the facts. Even the local censuses, taken in many parts of the Union for school purposes at brief intervals, often absorb a fortnight on a given area. Between the beginning and the close of such a count, births have tended to increase and deaths to decrease the total. In like manner changes of habitation have had some

* Presented at the Meeting in Washington, December 23, 1897.

† The author's most scrupulous care sometimes fails against mechanical accident. Not to name personal experiences where some displacement has occurred after final proofs were correct, a recent case is easily found in *The Independent*, January 6, 1898, in a table clearly prepared to show Presbyterian (northern) communicants: 1896, 923,515; 1897, 939,290, which latter stands as 29,299.

effect. It has been a complaint that in the month of June, when national counts have been made, the population of certain cities was considerably depleted by the departure of those who had gone for the season to work in the country or who had departed on journeys. It has been further said that not only are the conditions adverse to the showing for such a city, but farmers and entertainers often treat those newly come among them as transient non-residents and do not report them, so that any such omission affects the reported grand total of population. In general, those absent from home for periods covering the date of the census are liable to be omitted from the count in places of temporary sojourn without being credited to their places of legal residence.

Our methods are unlike those of various foreign countries. In the census of India, in Bengal, for example, in 1881, steps were taken to cover all cases so effectually that every one in the country on a given night was believed to be recorded, travelers on river boats or railways included, thus losing, as the officials claimed, from a direct count only those absent on voyages by sea. The French discriminate between actually present and the legal population. The latter is swollen by the number of French citizens abroad, amounting in 1891 to over half a million * (517,000).

In the matter of personal enumeration a suggestion has been repeatedly made that teachers might be advantageously utilized as the basis of the enumerating force. Probably it would be possible in some States and parts of States to obtain valuable results in that way, but there are large areas where schools are transient or wanting to such an extent that teachers might not be available when needed. It is quite worth considering whether the justice of the peace, the police magistrate of the smallest civil unit, with the constables in his jurisdiction, who are permanent residents, and acquainted with the by-places of human habitation in their vicinity, could not be utilized helpfully.

* *Statesman's Year-Book*, 1897, p. 472, in a total of 88,342,948.

When the enumerator passes from the count of items perceptible to him, like number, color, and sex; when he questions as to age, occupation in the past year, and so on, difficulties arise familiar to every one who has given this class of subjects close attention. Few persons, called on to state how the past twelve months have been distinguished in any way, can feel quite sure whether something familiar in their general remembrance occurred within a year or over a year ago. In the census of 1880 Dr. John S. Billings found this lack of identification of events with dates a serious difficulty in determining the value of physicians' returns. Preparatory to the census of 1890 he sent out to the profession blank forms on which they might record cases as they occurred, and in due time have an authentic history of the year's practice from which to fill a blank inquiry. Whatever added value there may have been in health or mortuary reports, the step taken was an important one in educating at least one group of the people, in making trustworthy records as a basis of trustworthy returns.

In this country there has been some disposition to despise family records and parish registries as savoring too much of the worship of ancestors. During the war of the rebellion those in the midst of its destruction saw the value of personal identification to the soldier separated by any exigency from his command. If a man was left in a hospital or sent on detached duty he was furnished with a descriptive roll giving his personal description as it appeared on the muster rolls and the condition of his accounts. With this statement, and proper authority for his presence, he could draw pay or clothing, according to his dues, wherever he found disbursing officers or quartermasters. Without the roll he was subject to great inconvenience or delay in satisfying his claims, if, indeed, he could secure any recognition of them.

It seemed to many that the day was at hand when the American people would keenly appreciate the need of responsible records of marriages and authentic registries of births and deaths. The pension roll was sure to be formi-

dable after the first few months revealed the probable magnitude of the war, and it was anticipated that proof of relationship would be of an importance. More than a generation has passed and we have made small gain. So far, indeed, as families once kept records in the big Bible, it is a question if the custom has not declined. Even when rules and regulations are put upon the statute book public sentiment does not recognize the importance of obedience to the requirements.

The income tax in force at the close of the war seemed likely to stimulate attention to definite private accounts, but it was presently abandoned before it had a permanent educative effect. The enormous sums absorbed in charities and pensions begin to startle the public, and a disposition is manifest that may encourage better registration for the clearer identification of the rightful inheritors of property or claimants for gratitude and support.

Many items have specific limitations as to the accuracy with which they can be reported. Thus the products consumable where raised cannot be so accurately or so readily determined as those which from the conditions must be brought together at factories or at shipping points. Changes arise modifying the readiness with which account can be taken of given products. Before the war of the rebellion the amount of cotton consumed in cotton-producing States was very small, and we could determine quite closely the total product when we knew the amount shipped from a few points to the North or abroad. The ease of such a collection of data had been slightly modified by the erection of factories remote from the seaboard and receiving the raw material by inland transportation, but the modification was insignificant compared with that which has come by the increase of shipping points and by the establishment of factories among the cotton fields. On the other hand, statistics of wool and of wheat can probably be gained more readily than in the days when a common arrangement at a convenient waterpower, in Ohio, for example, was a saw mill, a grist mill, and a carding factory, with a fulling

mill attachment, all for custom work. Even the farmer who raises wheat today sells his wheat and buys his flour. In like manner he sells his wool and buys his cloth. Wheat and wool thus come more prominently into view in accumulated masses for transportation or manufacture, while corn, still largely fed to animals on the farm, and used in varied forms upon the farmer's table, is more nearly in the condition of ante bellum times.

Not only is completeness of record necessary to accuracy of statistics ; the records of different localities to be compared or combined must be in the same form, or convertible to the same form, or the result will be defective. The State of Delaware keeps its school records in a form to show how many positions are occupied by teachers of each great race and of each sex. No account is made of changes of individuals by substitution during the year. In certain States the person is made prominent, and a school that at no time employed more than one teacher is liable to have a return of several teachers, according to changes from any cause during the school year. There is no uniformity of age for school attendance in the United States. In Massachusetts any one is allowed to attend, and his attendance is part of the record. In Texas return is not generally made in public records of those under eight or over sixteen years of age. Various independent districts in Texas have been empowered to make local rules for attendance, rules which are not uniform with one another nor with the State law. How can any proper comparison be made between Massachusetts and Texas, or between different localities in Texas, as to school enrolment? In certain parts of the country each group under a teacher who keeps an independent record is called a school, and there may be a dozen schools in one great building. Elsewhere may be found assemblages of pupils under one management called a school, occupying more than one building. How then can the number of school houses be derived from the number of schools? If we knew the number of schoolhouses, of what value would the bare number be without any discrimination between the

one-room house with a dozen pupils and the great city building with thousands of pupils and scores of teachers? There are very few items pertaining to education which can be tabulated on the same basis for the whole country, owing to the different terms used, the different age limits, the different sources of funds, and the different customs as to titles of school property in different parts of the country. Tables made to show the conditions require numerous remarks and explanations in adjacent text to warn the reader of their limitations, and these remarks and explanations are often ignored by those who cite the tables.

In passing, it may be noted that the customs of the South, in general, are to her undue disadvantage in comparison of public educational records. At the North, and in certain localities of the South, schoolhouses are recognized in the records as public property, and the schools are free for the school year. To a great extent, however, at the South, the neighborhood has erected its schoolhouse by unrecorded effort and expense, and has added to the public money by tuition or by contribution, which does not appear in the records of maintenance.

A disadvantage of imperfect current statistics is the unfavorable effect of increasing truthfulness upon comparisons. When in 1887 authorities in Pennsylvania struck 70,000 off the school returns of Philadelphia for duplicated enrolment, it was to that extent unfavorable for comparison with the previous year, and yet attendance evidently kept pace with the growth of the city; but an attempt to weed out the duplicate enrolment in transfers from one school to another, or by reënrolment after considerable absences, produced the diminution named in the statistics.*

There is hardly a subject of statistical inquiry in which perplexities do not arise from variable modes of dealing with the given group of facts. For example, take the criminal

* Letter of State Superintendent D. J. Waller, Jr., March 13, 1891, in *Census* (11th) *Report on Education*, page 6.

statistics. If we take arrests, commitments, fines, or convictions as a basis of comparison we must recognize so many local influences upon the figures as to be confusing, or we must make the figures useless by disregarding the local influences. In arrests, an unfortunate whose bicycle lamp has gone out after sundown may swell the account as much as a murderer, or the boy who threw a ball in the street offset the lad who snatched a woman's purse in the market. The complications arising from the variations of municipal law are so great that some students of criminology are disposed to condemn in wholesale way all comparative tables for the parts of the country as related one to the other. In the *North American Review* for December, 1897, Prof. Cesare Lombroso points out that the variation in definitions of homicide between our States and European countries makes comparisons for homicides in them of low value. Among his authorities he names the United States census. He might further have reminded his readers that the census makes no claim to show the number of crimes of any form in a year or other unit of time, but only to show the number and characteristics of persons held as prisoners on a given day, June 1, 1890, producing a form of record in the summaries of the *Statesman's Year-Book* (1897) most limited of all considerable countries except—

Chili (1894).	In penal establishments, December 31st,	5,263
	Condemned,	2,163
	Under trial,	3,121

The *Year-Book* does not show what may be found in the census report,—that of 82,329 prisoners in the United States over 10 per cent (9787) were waiting trial. This would enable a statement corresponding to that for Chili to be made, but no distinct showing is made of the alleged offences of these 9787. For a double purpose of showing the fuller forms of other countries and the impossibility of determining offences in a year from the prisoners of a day, some countries are cited:—

West Australia, 1895:—

Offences reported to the police,	9,070
Apprehended or summoned,	8,377
Convicted of petty and serious offences,	5,308
Committed to prison in the year,	1,464
Convicts in the colony, December 31st,	113

Belgium, 1894:—

Criminals sentenced,	44,908
Mean number of inmates of prisons,	4,413

German Empire, 1894:—

Cases tried,	1,262,526
Convictions, petty and serious,	446,110

Italy, 1894:—

Convictions, petty and serious,	370,144
In prisons, all grades, December 31st,	70,989

We can hardly expect to reach a full record of crime, with an annual report like European countries, even if on the model of West Australia, since that fails to reach initial crimes or retributive lynchings not duly reported to the authorities. The day may come when the magistrates of the smallest civil units will report to those of higher units and so on to the highest courts of the States, whence the consolidated reports may be annually brought together with all like reports from federal tribunals, perhaps at the National Department of Justice.

There would be a distinct gain if the official forms in Europe and America could be harmonized in their use of terms where the facts admit uniformity. For example, certain Italian, German, and French reports give age periods in this form: 20 to 25, 25 to 30, 30 to 35; some reports from English speaking countries use this form: 20 to 25, 26 to 30, 31 to 35; other reports from English-speaking countries follow the custom of the continental reports cited, and we in the United States follow one form in certain laws and reports and the other form in some cases.

The changes in material conditions, the new employments of recent dates, make it impracticable to continue all terms in their original force or limitations. It becomes important to approach uniformity of treatment as far as possible. If the merchant jeweler who does no metal work beyond mending a ring or making initials on articles sold is called a manufac-

turer in one set of tables and left out in another,— if in one set of tables the country blacksmith is passed by and in another every plowshare he sharpens, every barn-door hinge he mends, goes into the sum of manufactures, only the relative insignificance of their work leaves any value in the tables for comparative purposes.

A very wide difference in results comes from the diverse interpretations put upon the same facts. Some give the value of manufactures as the value of the articles when put upon the market by the manufacturer; others deduct from this selling value the value of the materials as they came to the manufacturer's hand, crediting to manufactures only the increment of value arising from the new form. The agricultural interest has similar conditions. A large business is done in the corn belt, in fattening sheep and cattle brought from the plains. When a farmer of Iowa or Illinois sells a drove of fat stock in Chicago for \$4000, he may have paid \$2000 for the same animals in Dakota or Montana subject to additional expense of transportation. It is of consequence whether the farmer with corn is credited with the production of \$4000 in food or only with the increment put on the value in a brief period of feeding.

The investigator of property values and the student of taxation are continually brought to face perplexing questions of interpretation. One set of accounts may credit borrowed money to receipts, and charge payment of bonds to expenses; another set in like circumstances will credit receipts only with the premiums on loans, and charge to expense only interest and cost of negotiation. A third set may be found to have followed one course at one time and the opposite course at another. If one attempts to follow closely the discussions regarding municipal ownership of natural monopolies,—gas supply, for example, he will find absolutely opposite conclusions deduced from the same basic facts according to the manner of combining these facts. Some would charge this variation to bad book-keeping, but, no matter by what name the conditions are called, there is a confusion of informa-

tion requiring the utmost care of the impartial student and his sharpest questioning to learn how the figures are combined for balance sheets. In cases of importance it is sometimes necessary to go back of the returns, to borrow a political expression, to determine the proper conclusions. Every one who has paid much attention to municipal accounts can recall instances of transfer from one fund to another, as from the bridge fund to the school fund, or from the school fund to the street fund. A minor transfer of expense liable to fail of entry in the books is still important enough to be sought in nice discussions, as to the profitable or unprofitable management of public water works, for example. Let us suppose a city to have bought 2000 tons of coal, of which 100 tons are charged to the fire department, 100 to the police department, 400 to a pumping station, 1400 to a gas plant. It requires no exaggerated imagination to see that in any emergency which leads one of these interests to borrow from the coal pile of another, the credit to one, and the charge to the other, which pertains to sound private administration, are much more likely to be neglected under a general impression that it is all city coal.

In the late census no inquiry was followed with more skillful care and conscientious fidelity than the investigation regarding farms, homes, and mortgages. An element of uncertainty was recognized where the record showed a large mortgage but where the amount still in force was smaller, with record of reduction to be embodied in a release on a final payment. Stated in a concrete form: A mortgage to secure five notes of \$1000 each falling due, annually, in succession, would at first express correctly an indebtedness of \$5000; it would continue to represent \$5000, as the indebtedness in many an instance, while it really shrunk to \$4000, \$3000, \$2000, and \$1000, to be canceled at the last payment.

Let us now turn to questions of wages. How are the wages of teachers in a city that furnishes all books and materials used by its teachers comparable with those in a locality where

the teacher is required to furnish herself with a full set of books used in her grade or to supply the materials used in certain primary exercises by the children? A growing business exists in securing positions for a compensation. How are the net earnings of teachers appointed under such influences to be compared with those of teachers who are not paying fees for their situations? After the investigator knows the general truth in either condition named, how is he to secure facts in detail, reducible to figures?

Many people have difficulty in maintaining comparisons between conditions of unlike degrees of simplicity. The nominal salary attached to an office is a simple element, but many public positions, from the nature of the case, are filled by persons who receive also a greater or less part of living expenses, as house rent, fuel, or board for themselves or families. Other officers must incur cost of keeping a horse, or other outlay, to fulfill the duties of their positions. Boards of local legislators often appear to compare gross salaries in such cases instead of net compensation. The same difficulty affects the house-girl question and other relatively low-priced service. The girl who has \$3 a week, with board and lodging, envies the girl with \$5 a week or less who must maintain herself, pay 60 cents a week car fare to go to and from a store or office, and in the busy, long dark evenings of the holiday season pay 10 cents a day more car fare for her mother or other protector to see her safely home, besides submitting to dockings and fines for minutes of tardiness or for mishaps and accidents of her situation.

A typical instance of false interpretation may be found in the subject of interior artificial waterways. This subject was treated in the November (1897) *Review of Reviews*. The fundamental facts as to possibilities between Lake Michigan and the Mississippi River have not changed in the seventy-five years since Congress gave the right for a canal to connect these waters by way of the Illinois River. This was followed by a land grant, and a second land grant, and by expenditures in aid of deepening the Illinois River, and by the inaugura-

tion of a canal westward from Hennepin, on the Illinois, to the Mississippi. Congresses have been successfully persuaded that all this was best, but the *Review* writer has another opinion based on a real Chicago drainage canal 26 feet deep, some 80 miles long, a theoretical extension of the same 66 miles long, a consequent deepening of the Illinois River to 14 feet, with a vision of a possible ship canal to the Rocky Mountains; all so grand that he says: "It is almost needless to add that the Hennepin Canal, now under construction, always a bungling and preposterous job, will be rendered wholly useless and must shortly be abandoned." The subject of these waterways bids fair to outlast the youngest of us. The discussions are of deep import to the welfare of the country, to the treasury of the United States, and to the individual tax payer, who must keep the public credit good. We must learn to discriminate between things accomplished, things remotely possible, and, it must be added, things visionary. By courtesy of the Chief of Engineers, U.S.A., I am able to state some actual conditions upon official authority*.

*The Letter explains itself.

Office of the Chief of Engineers,
United States Army,

WASHINGTON, November 20, 1897.

Mr. JAMES H. BLODGETT,

No. 1229 N Street, N. W., Washington, D. C.

Sir:—Receipt is acknowledged of your letter of November 26, 1897, requesting information as to draft of boats when certain improvements now authorized are completed.

At present the government has no plans for deepening of channel between Chicago and the Illinois River. Present communication is by the Illinois and Michigan Canal—a State institution—of small capacity. A drainage canal is in course of construction from the Chicago River westward, but no arrangements have yet been considered by the United States for utilizing this for purposes of navigation. Surveys have been made and plans submitted for connecting Lake Michigan and the Illinois River, but Congress has not taken action in the matter.

The Illinois River is under improvement contemplating a depth at low water of 7 feet. The Illinois and Mississippi Canal, from Hennepin on the Illinois to Rock Island on the Mississippi, will furnish when completed a depth of 7 feet.

The improvement of the Mississippi River, from Rock Island to St. Paul, contemplates a depth of 4½ feet at low water to be eventually increased to 6 feet. The same depths are proposed between Rock Island and the mouth of the Missouri.

Between mouth of the Missouri and St. Louis 6 feet at low water is proposed; between St. Louis and Cairo 8 feet. Below Cairo the improvement of the Mississippi is under the charge of the Mississippi River Commission, whose plans it is understood contemplate minimum depths of from 8 to 10 feet.

By direction of the Chief of Engineers.

Very respectfully, your obedient servant,

A. MACKENZIE,
Lieut.-Col., Corps of Engineers.

The situation on completion of the Chicago drainage canal and all other work thus far authorized would be this:—

A vessel from Buffalo or from Duluth could come into the drainage canal with 20 feet draft and room to spare. From Lockport, 80 miles or so out of Chicago, through the Illinois and Michigan Canal, the Illinois River and the Mississippi River, there would be no more than six feet at low water to St. Louis. From Hennepin westward there would be seven feet to the Mississippi; then up to St. Paul four and one-half feet, ultimately six feet.

With the theoretical extension suggested in the *Review* article the lake vessel of 20 feet draft could reach LaSalle, nearly 100 miles from Chicago; then but 14 feet is promised to the mouth of the Illinois, and other measurements remain as noted already. It must be remembered that the draft for through traffic is fixed by the shallowest place, determined for the lakes by the St. Clair flats and the lock at the head of St. Mary's River. Comparisons with a map in hand will make the situation clearer. Those who have been captivated by the vision of the Chicago drainage canal as a section of a great ship canal can profitably begin computations as to the excavations and the cost to come before a vessel loaded to the full draft of that canal could get beyond its present miles of length.

Such conditions make it important for personal prosperity and the national good that the most rigid care be used in defining terms and explaining limitations in statistical work that is to endure with credit.

The article just cited (*Review of Reviews*, November, 1897) contains a statement, oft repeated, with variations of expression, in the past few years, to the effect that the tonnage passing through the outlet of Lake Superior is greater than that passing through the Suez Canal. Perhaps the latest variation is in *Harper's Magazine* for January, 1898,* where the tonnage (16,289,601 tons) passing through the St. Mary's

* *The New Northwest*, page 207.

Canal (lock) in 1896 is said to be nearly twice that through the Suez Canal in 1895, which, according to the *Statesman's Year-Book*, was 11,833,687 gross tons, apparently two-thirds instead of one-half the St. Mary's tonnage. The statements made by different authorities vary so much in use of terms, as dates, tons, gross tons, net tons, that verification is not easily made. If any one of these statements is right, of what value is mere tonnage in determining commercial consequence? In a single season the tonnage carried over the aqueduct bridge from this district into Virginia was increased several thousand tons. That looks more like an increase of business than when one finds that the great increase of freight and of wagons crossing was due to digging away a hill and carrying the earth and rock excavated for a union transfer station at one end of the bridge to a dump at the other end. Authorities that should be reliable do not fully agree in their figures, but from several authors a table can be made showing various comparisons between these canals:—

	ST. MARY'S CANAL.	SUEZ CANAL.
Cost.....	\$5,000,000 (Old lock, \$1,000,000 ¹ ; new, \$5,000,000 ²)	\$25,000,000 ¹
Length.....	Over 1 mile ³	87 miles ¹ ; 92 miles ⁴
Depth.....	21 feet ³	31.2 feet ¹ ; 26 feet ⁴
Av. tonnage of vessels, 1894....	856 tons ³	2,300 tons net ³
Value of freight, 1894.....	\$143,114,502 ³	\$300,000,000, roughly ³
Value per ton, 1894.....	\$10.84 ³	\$37.00
Tonnage, 1895.....	Registered, 16,806,781 ³	Gross tons, 11,833,687 ³
Passengers, 1895.....	31,656 ³	216,936 ³
Length of trip, roughly.....	800 miles	8,000 miles

¹ *Johnson's Cyclopadia*, ed. 1895. ² *Review of Reviews*, November, 1897. ³ *Statistical Year-Book of Canada*, 1895. ⁴ *Mulhall's Dictionary of Statistics*, 1892. ⁵ *Statesman's Year-Book*, 1897.

The tables of the *Statistical Year-Book of Canada* (1895), show an analysis of all freight passing through the St. Mary's lock from its opening. Iron ore, wheat in grain or in flour, made a large part of the east-bound freight, and coal was a

large item in return freight. The Suez Canal bears westward the costly products of the Orient. Not only a variety of items, as in the table, must be considered to make any comparative estimate of the two works, but we must remember that the great ships of the European powers can pass through the Suez Canal, a fact of great import to the welfare of nations.

After all, why these comparisons with the Suez Canal? The question for us is not whether our work is greater or less than some other but whether its utility justifies.

It is impracticable to reach close accuracy on a variety of important subjects, but we can discriminate between statements of some mathematical accuracy and those in which only a very general approach to accuracy can be claimed. The cost of the Suez Canal is given by different authorities from about \$70,000,000, presumed to have been expended directly for the canal, to nearly \$100,000,000, which, presumably, it cost the promoters after all discounts and charges connected with the project; and the explanations are not always appended. The words "estimated," "probably," and "approximate" often require a place not merely in explanatory text but also when incorporated in titles and tabular headings, where they can stick when exchanges clip the items for republication. When tables that may contain 25 per cent or more of error are sent out with the same certificates of character that are given to those of definite accuracy it must be expected that the whole subject of statistics will receive less respect than it ought to deserve. The word "undoubtedly," with its variations, has done much mischief. If writers would use it only when ready to defend it in its original sense it might recover its standing, but it is now used, to a great extent, to cloak a real ignorance of the exact truth. If the truth is known the word is unnecessary.

A serious fact in connection with the collection and publication of statistics is the general failure to remember that any unit, no matter how insignificant, becomes overwhelm-

ing with a sufficient multiplier. Many an investigator, on his own promptings, has added a question to his circulars, and many a legislative enactment has been swollen in its call for facts, under the feeling that while an investigation is in progress another question will make no difference in cost or trouble. As I have elsewhere stated,* one question that could be answered by yes or no would demand at least one second from each person addressed and another second for combining it with other replies, so that a question effecting each of the population would require the equivalent of 100 enumerators for a month and eight tabulating clerks for a working year. Every time the item enters into a report there must be a corresponding, even if smaller, multiplication of figures, words, lines, or columns.

This affects the cost and the results in a great work like the census in many serious ways. The more questions people, in all parts of the country, persuade their respective representatives to attach to a census, under an impression that it will make no difference, the larger will be the schedules, the more expanded the instructions for the enumerator, till they outgrow his patience or his comprehension. When the returns are gathered, some subjects are so unsatisfactorily reported that all the work upon them is absolutely abandoned, and even that known to be valuable is delayed and burdened with the cost of the mass, till some valuable material fails of publication. Thus in the Tenth Census nearly the entire material on education, the reports on churches and Sunday schools, on marriage and divorce, were lost to the public after the expense of collection. A report of illiteracy by counties, especially for States of great variation in physical or racial conditions, as the mountains and lowlands of Tennessee, or the corresponding race districts of Mississippi, would be very welcome now, but the expenses of the Eleventh Census, swollen by questions that perished, have exhausted

* *Report on Education, Eleventh Census, page 2.*

the appropriations, and the census, like former ones, is closed, not finished.

If the statisticians of the coming generation are to improve upon our work; if the prospective citizens, now in school, are to have an intelligent apprehension of the subjects to require public action, it is highly important that they shall not be misinformed through elementary text-books. There should be close scrutiny of the books used by our children, especially those which deal with matters of information, like readers and geographies. Books bearing the names of high authorities ought to represent the best knowledge of the day, not lie open in matters of fact to criticism by observant children. An elementary book of this year (1897) contains the statements that an Indian rubs two flint stones together and makes a little spark with which he lights his pipe; that a silkworm becomes a butterfly; and that palm-leaf fans grow on cocoanut palms.

The question of governmental aid to transportation projects grows in its financial aspects. With all the importance of accurate knowledge regarding the relation of our interior waterways, a recent geography represents the St. Mary's River, connecting Lake Superior and Lake Huron, as about 60 miles long, composed of rapids, and not navigable, but avoided by a canal, and thus confuses truth and error. Another geography represents the St. Mary's as the largest ship canal in the world without any suggestion of the basis of comparison. Comparison has already been made here with the Suez Canal in several particulars, in most of which the ship canal between the Baltic and the North Sea also surpasses the St. Mary's, whose greatness lies in one stupendous lock,* that seems to have filled the eyes of these writers to the exclusion of all other qualities of size in a canal. Two rival books, apparently using, to an extent, the same base

* According to *Statistical Year-Book of Canada*, 1896, p. 674, it is 800 feet long, 100 wide, has 21 feet of water on the sills, and a lift of 18 feet. By the same *Year-Book*, 1896, the lock lately built on the Canadian side is 800 by 60 feet.

maps, represent the Illinois River as formed by the Fox and the Des Plaines, at Ottawa, instead of by the Kankakee and the Des Plaines farther east. One, in text, gives the four lakes adjacent to Madison, Wis., as the source of Rock River. Various books continue to represent on their maps canals that have ceased to be used for many years. On certain maps the railroads are represented erroneously and inconsistently to a degree that renders them useless for any definite information. One book has this view of agricultural economics: "The wheat belt extends northward nearly to Hudson Bay and southward nearly to the Gulf of Mexico. The limits of the corn belt are somewhat narrower, not because corn will not thrive beyond its present limits, but chiefly because the hog cannot be profitably raised. Beyond these limits corn is valuable only to the extent to which it can be converted into pork and beef." Another tells the children of cotton: "The pods, or balls, containing the seeds, and the fiber around them, are picked by hand and taken to a gin."

These illustrations are not from obscure books selected as literary oddities; they occur in books of current use with superlative indorsements. The maps, the text, and the pictures in the books of our children require our attention if truth is to be taught. Text-books for colleges and universities are likewise sometimes printed with obvious errors, as when a prominent author states that no city ever ceases to be part of a county and pay county taxes, ignoring Baltimore, St. Louis, and the cities of Virginia; and that the Bureau of Engraving and Printing is a bureau of the Treasury that prints all the public documents.

The oral instruction in the schools is generally beyond our reach; but we may be sure that oral lessons, the object lessons of the day, drawn from such authorities as just cited, add to the distortion of fact. The effect upon the child or the student who detects the error, sometimes on the moment, sometimes later, is twofold. It tends to an indiscriminate discredit of authorities. It lowers his estimate of the value

of good work in practical affairs, leading toward reliance on adventitious circumstances for power and success, a condition unfavorable for the rising generation of statisticians.

The individual statistician must scan closely the authority on which he rests, and guard his statements with all the cautionary words which imperfect knowledge requires, or some mere child will point out the errors in his statements and his conclusions and set people wondering of what value the rest of his work may be. The sharp cross-questioning of individual investigation has a tonic effect on men who have not adequately guarded their statements or clearly defined their inquiries heretofore.

So far as any organized effort can be made for the betterment of statistical work this association has a prominent opportunity, for which free discussion and friendly criticism are among the immediately available means.

UNIFORMITY IN CENSUS RETURNS.

At the last meeting of the International Institute of Statistics, held in St. Petersburg, a paper on a World's Census in 1900 was presented by Dr. Joseph de Kőrsei. In this complaint is made of the lack of uniformity of censuses on certain very important points relating to the population. The author observes that one of the reasons for the establishment of the Congress of Statistics was the securing of uniformity of statistical work published by the bureaus of different countries. In nine of the Congresses thus far held six have considered this question of uniformity. There is still everywhere, however, complaint that the census inquiries, thus far made so enormous and so costly, contain very little as yet which is comparable. Congresses have had some influence in securing uniformity in schedules adopted, but there has not been a sufficient insistence upon the question of abstracting the data furnished by the schedules, according to a uniform system. In many cases, even where the raw material exists alike for all, the results have been worked up according to different schemes. Take for example the question of age. In most countries the results are published for each year of age; but in some age is indicated only by groups, more or less extensive; in some quinquennial, in others decennial. One cannot undertake an international comparison for children of school age, or of youth of military age, or of individuals of the age of procreation, or of individuals of the age of legal responsibility. It is impossible to measure the tendency to crime among different nations, since it is impossible from the censuses at hand to compare the ages. The age is abstracted year by year during the first part of life in France, Greece, Ireland, Netherlands, Scotland, while those of later age are indicated only by quinquennial groups. In England after the 25th year only decennial groups are given. A comparison of the civil state of the population fails. In many states, as, for example, in England, Greece, Ireland, Portugal, Roumania, and Scotland the number of divorced are not given, while Finland groups the divorced with widowers and widows. The statistics of nativity and of political allegiance are not satisfactory for purposes of comparison. In a number of states the nativity by sex is given, as in the German Empire, Bulgaria, Denmark, Scotland,

Ireland, Sweden, and Switzerland, but in other countries there are more or less important variations. Nativity is not asked in Spain, Esthonia, Greece, Livonia, or Portugal; in Finland it is asked only for ten countries. In Belgium, Denmark, and Switzerland all countries are given, but there is no distinction of sex. In England the abstract is made only for countries of the British Empire, while in France, Hungary, Italy, and the Netherlands the question is placed on the census schedule, but the results have not been elaborated.

In the year 1887, at the Congress in Rome, an international schedule was adopted, and it was accepted the same year by the Congress of Demography held at Vienna. The schedule included the following inquiries: —

1. Age for each year.
2. Age in the *city* and in the *country*; quinquennial groups of age for —
 - (a) The country, that is, districts with less than 2000 inhabitants.
 - (b) Towns from 2000 to 100,000 inhabitants.
 - (c) Large cities with more than 100,000 inhabitants.
3. Civil state; not married, married, widowers and widowed, divorced.
4. Civil state according to age; quinquennial groups beginning with the age of 15 for each of the four categories under No. 3.
5. Religion (those having at least 1000 followers).
6. Age by principal religions; decennial groups.
7. Number of those above 15 years of age who cannot read.
8. Number above 15 years of age, according to the principal religions, who cannot read.
9. Nationality (those represented by at least 1000).
10. Age by principal nationalities; decennial groups.
11. Principal nationalities by principal religions.
12. Those above 15 years of age, by principal nationalities, who cannot read.
13. Country of birth.
14. Political allegiance.

The following table shows the results of recent European censuses on the first five of the points suggested: —

Yes = Results comparable; No = Not comparable.

Year of Census.	1. Age by year.	2. Age in cities and country; quinquennial groups for— a. Country districts below 2000. b. Cities, 2000-100,000. c. Cities, over 100,000.
1. GERMANY. 1890. Dec. 1.	Yes. ¹	No. Age: —15, —40, —60, 60—. Cities classified as: 5000-20,000, —100,000, 100,000— inhabitants.
Alsace-Lorraine. 1890. Dec. 1.	Yes.	Yes. Cities: —2000, —5000, —20,000, —100,000, 100,000—.
Anhalt. 1890. Dec. 1.	Yes.	No.
Baden. 1890. Dec. 1.	Yes.	No. Decennial groups for districts below 2000 and 2000-20,000, quinquennial groups for cities over 20,000.
Bavaria. 1890. Dec. 1.	Yes.	No. Classified only as cities and country.
Brunswick. 1890. Dec. 1.	No. ² 0-15, each year, —18, —20, then by groups.	No. (Other age groupings.)
Bremen. 1890. Dec. 1.	No. ² 0-1, 1-5, then by groups to 40, —40-50, —60, —65, —70, —80, 80.	Not on schedule.
Hamburg. 1890. Dec. 1.	Yes.	Not on schedule.
Hesse. 1890. Dec. 1.	Yes.	Yes.
Lubeck. 1895. Dec. 2.	Yes.	Not on schedule.
Mecklenburg-Schwerin. 1890. Dec. 1.	Yes.	Not abstracted.
Oldenburg. 1890. Dec. 1.	Yes.	No. Without sex.
Prussia. 1890. Dec. 1.	Yes.	No. Special classification for cities above 5000. Ages: —15, —40, —60, 60—.

¹ In all of the States of the German Empire age is taken not by "years of age" but according to "year of birth". As the census is taken on December 1 the difference is appreciable, since the first year comprises only 11 months instead of 12. The returns, however, are indicated as comparable with the international schedule, although it is not strictly true.

² Comparable in the census of the German Empire.

3. Civil state. Not married, married, wid- owers or widows, divorced.	4. Civil state according to age; quin- quennial groups beginning with 15 years for each of four classes.	5. Religion. (Sects having at least 1000 followers.)
Yes.	Yes. —15, —18, —20, —21, 25 and up- wards by quinquennial groups.	No. 18 sects, but no distinction as to sex.
Yes.	Yes. Each year.	Yes.
Yes.	Yes.	Yes. 18 sects.
Yes.	Yes. Each year.	No. Only 4 sects.
Yes.	Yes. Each year.	No. Without sex.
Yes.	No. ²	No. Only principal sects and with- out sex.
No. Divorced not classed.	No. See previous column. Age 20-40 by quinquennial groups, 40-50, 50-65, 65—	No. 6 sects without sex.
Yes.	Yes. Each year.	Yes. 14 sects.
Yes.	Yes.	Yes.
Yes.	Yes. Each year.	Yes.
Yes.	Yes. Each year.	Yes.
Yes.	Yes.	Yes. 7 sects.
Yes.	Yes.	Yes. 17 sects.

Year of Census.	1. Age by year.	2. Age in cities and country; quinquennial groups for — a. Country districts below 2000. b. Cities, 2000-100,000. c. Cities, over 100,000.
Saxony. 1890. Dec. 1.	No. ³ Quinquennial groups.	Not abstracted.
Saxe-Meiningen. 1895. Dec. 2.	Yes.	Yes.
Thuringian ³ States. 1890. Dec. 2.	Yes.	No. Only for cities above 10,000.
Württemberg. 1890. Dec. 1.	Yes.	No. Only percentages. Different classification, without sex.
2. AUSTRIA. 1890. Dec. 21.	Yes.	No. Decennial groups. Population: —500, —2000, —5000, —20,000, 20,000.
Bosnia-Herzegovina. 1895. April 22.	Year by year, but only for males. ⁴	Not abstracted.
3. BELGIUM. 1890. Dec. 31.	Yes.	No. Age year by year. Population; —5000, —10,000, 10,000—.
4. BULGARIA. 1893. Jan. 1.	Yes.	Not abstracted.
5. DENMARK. 1890. Feb. 1.	Yes.	No. Classification only between cities and country.
6. SPAIN. 1887. Dec. 31.	Yes.	Not abstracted.
7. FRANCE. 1891. April 12.	No. Each year, 0-24, then giving groups.	No. Age: 0-1, —19, —39, —59, —60, 60— Population: —5000, 10,000-20,000, —30,000-100,000, 100,000—.
8. GREAT BRITAIN. England. 1891. April 6.	No. Quinquennial groups to 25, then decennial.	Not abstracted.
Scotland. 1891. April 5.	No. (See England.)	No. Age, —15, —20, —40, —60, 60— for cities, more than 10,000.

³ Thuringian States: Saxe-Weimar, Saxe-Altenburg, Schwarzburg-Sonderhausen, Schwarzburg-Rudolstadt, Reuss Aelterer Linie, Reuss Jüngerer Linie.

⁴ Out of regard to the Mohammedan population age is asked only of males in Bosnia-Herzegovina.

3. Civil state. Not married, married, wid- owers or widows, divorced.	4. Civil state according to age; quin- quennial groups beginning with 15 years for each of four classes.	5. Religion. (Sects having at least 1000 followers.)
Yes.	Yes.	Not abstracted.
Yes.	Yes. Each year.	Yes.
Yes.	Yes. Each year.	Yes. 12 sects.
Yes.	Yes. Each year.	No. 20 sects without sex.
Yes.	Yes.	Yes. 17 sects.
Not abstracted.	Not abstracted for men. ⁴ Not on schedule for women.	No. Without sex.
Yes.	Yes. Each year.	Not on schedule.
Yes.	Not abstracted.	Yes. 6 sects.
Yes.	Yes.	Yes. 14 sects.
No. Divorced not given.	Not abstracted.	Yes. 5 sects.
Yes.	Yes. (See column 1.)	Not on schedule.
No. Divorced not given.	No. (See columns 1 and 3.)	Not on schedule.
No. (See England.)	No. Age comparable, but lack divorced.	Not on schedule.

Year of Census.	1. Age by year.	2. Ages in cities and country ; quinquennial groups for — a. Country districts below 2000. b. Cities, 2000-100,000. c. Cities, over 100,000.
Ireland. 1891. April. 5.	No. Each year to 20, then quinquennial groups.	No. Only for cities of more than 2000.
9. GREECE. 1879. July 21.	No. Each year to 30, then quinquennial groups.	Not abstracted.
10. HUNGARY. 1890. Dec. 31.	Yes.	Not abstracted.
11. ITALY. 1881. Dec. 31.	No. Each year 0-10, —10-12, —15, then quinquennial groups.	No. Only principal towns and country specified.
12. NORWAY. 1891. Jan. 1.	Yes.	No. Classification between cities and country.
13. NETHERLANDS. 1889. Dec. 31.	Yes.	No. Each year, but only for cities above 20,000.
14. PORTUGAL. 1890. Dec. 1.	Not abstracted.	Not abstracted.
15. ROUMANIA.	No. 0-1, —5, then quinquennial groups to 60, then decennial.	Not abstracted.
16. RUSSIA. Esthonia. 1881. Dec. 29.	Yes.	Not abstracted.
Finland. 1890. Dec. 31.	Yes.	No. Only cities and country.
Livonia. 1881. Dec. 29.	Yes.	Not abstracted.
17. SERBIA. 1890. Dec. 31.	No. 0-30, each year, then quinquennial groups.	No. Only cities and country.
18. SWEDEN. 1891. Dec. 31.	Yes.	No. Only for cities below 10,000, —100,000, — and above 100,000.
19. SWITZERLAND. 1893. Dec. 1.	Yes.	No. Only for cities above 10,000.

² Divorced not given, as law does not permit divorce.

³ An attempt was made to state the number of Protestants and Jews in an inquiry of the pastor and rabbis. (Vide *Annali di Statistica*, 3 Serie, No. 7-8, 1883.)

3.	4.	5.
Civil state. Not married, married, widowers, or widows, divorced.	Civil state according to age; quinquennial group beginning with 15 years for each of four classes.	Religion. (Sects having at least 1000 followers.)
No. (See England.)	No. (See Scotland.)	Yes. 297 sects.
No. Divorced not given.	Not abstracted.	No. Only 3 groups.
Yes.	No. Quinquennial groups, 15-30, decennial, 30-60, above 60.	Yes. 9 sects.
Yes. ¹	Yes. ²	Not abstracted. ²
Yes.	Yes. Each year.	Yes. ¹
Yes.	Yes. Each year.	Yes. 28 sects.
No. Divorced not given.	Not abstracted.	Not on schedule.
No. Divorced not given.	Not abstracted.	No. 7 sects, but without sex.
Yes.	Yes.	Yes.
No. Widows, widowers, and divorced in the same category.	No. Each year, but see column 3.	Yes. 3 sects.
Yes.	Yes.	Yes.
Yes.	No. Age, below and above 15.	Yes. 7 sects.
Yes.	Yes.	Yes. ²
Yes.	Yes. Each year.	No. Only 3 sects, but without sex.

¹ Statistics of religions in Norway now in press.² Statistics of religions in Sweden published in Part (d) *Bidrag till Sveriges Officiella Statistik*, XLIV, 2, Table 6.

The results for the remaining inquiries can be more briefly presented.

No. 6. Age by principal religions ; decennial groups.

Only in Livonia, Sweden, and Denmark are the results comparable, and in the latter the data are for each year of age. In Belgium, France, England, Scotland, Italy, and Portugal the question was not placed upon the schedule. In the other countries the data were not abstracted.

No. 7. Number of those above 15 years of age who cannot read.

In Bosnia-Herzegovina and Belgium the results are comparable for each year of age ; in Ireland for each year between 20 and 24, then by quinquennial groups ; in Esthonia and Livonia for age above 14 ; and in Hungary and Italy they are comparable according to the international schedule. In Austria the results are not comparable,—the ages being given from 6 to 10 for each year, and then by decennial groups ; in Bulgaria they are given for the whole population above 6 years of age ; in Spain, Greece, Portugal, Roumania, and Servia they are given only for the total population ; and in Finland for the population above the age of 10. In the other countries the inquiry was not placed upon the schedule.

No. 8. Cannot read, above 15 years of age, by principal religions.

In Austria, Bosnia-Herzegovina, Bulgaria, Spain, Greece, Roumania, Esthonia, Finland, Livonia, and Servia the data were not abstracted from the census schedules. In Ireland the results are not comparable as they are indicated for the population above 5 years of age. In Hungary the results are not comparable as they are given only for the total population. In all the other countries the question was not placed upon the schedule.

No. 9. Nationality.

Results are comparable in Prussia, Esthonia, Livonia, and in Austria (for 9 nationalities according to the language spoken) ; in Bulgaria (for 15 maternal tongues) ; in Hungary (for 12 maternal tongues) ; in Finland (for 4 according to language spoken) ; in Servia (22 nationalities according to language spoken) ; and Sweden (8). They are not comparable in Belgium (only 3 spoken languages) ; in Roumania (7 nationalities without sex) ; and in Switzerland (5 nationalities according to maternal tongue, but without sex). In all the other countries the question was not placed upon the schedule.

No. 10. Age by principal nationalities ; decennial groups.

The results were not abstracted for Belgium, Bulgaria, Roumania, Finland, Servia, or Switzerland. They are comparable in Prussia, Austria (up to 70 years); Hungary (up to 60 years); and Sweden (by quinquennial periods). They are not comparable in Esthonia and Livonia (decennial groups up to 30 years, then by groups of 20 years). In the other countries the question was not placed upon the schedule.

No. 11. Principal nationalities by principal religions.

The results were not abstracted in Austria, Bulgaria, Roumania, Finland, Livonia, Servia, or Switzerland. The results are comparable for Prussia, Hungary, Esthonia, and Sweden. In the other countries the question was not placed upon the schedule.

No. 12. Cannot read, above 15 years of age, by principal nationalities.

The results were not abstracted in Austria, Belgium, Bulgaria, Roumania, or Servia. They are comparable in Esthonia and Livonia (for age above 14 years). They are not comparable in Hungary (only for the total population), and in Finland (for the ages above 10).

No. 13. Country of birth.

The results were not abstracted in Bavaria, Brunswick, Bremen, Bosnia-Herzegovina, Italy, or Netherlands. They are not comparable in Oldenburg (classified only in European countries); in Belgium (only 10 countries and in part without distinction of sex); Denmark (without sex); Spain and France (foreign countries not specified); England (specified only for British possessions); Hungary (omits specification of foreign countries); Finland (only 10 countries mentioned); Switzerland (38 countries without sex). In other countries the results are comparable.

No. 14. Political allegiance.

The results were not abstracted in Mecklenburg-Schwerin. They are not comparable in Bavaria (without sex); Brunswick (omits specification of German States); Bremen (only 5 countries, without sex); Bosnia-Herzegovina (specifies only Austria-Hungary); Belgium (only 10 countries and in part without sex); Spain (only six countries); Greece (only 13 countries and without sex); Netherlands (6 groups of States); and Switzerland (37 countries but without sex). In Denmark, Great Britain and Ireland, Norway, Portugal, Roumania, Finland, and Sweden the question was not placed upon the schedules. In other countries the results are comparable.

COST OF PRODUCTION OF CORN AND OATS IN ILLINOIS IN 1896.

Bulletin No. 50 of the State of Illinois Agricultural Experiment Station (February, 1898) contains an account of an investigation of the cost of production of corn and oats in Illinois in 1896, made by Mr. Nathan A. Weston. It is impracticable to reproduce the statistical data in detail, but the novel character of this investigation justifies a reproduction of the larger portion of the text. Prof. David Kinley in an introductory note states that:—

The limits of the scope of the inquiry should be emphasized. The results presented concern the corn and oats' products of Illinois in the season of 1896 only. The figures of cost in one year cannot be used for any other; for, of course, the cost varies with the yield and the season. A given total of expenditure in a season when the yield of corn was 40 bushels to the acre would give a different cost per unit of measure from what it would give when the yield was 60 bushels. This fact shows the fallacy of the tables of some of the Illinois crop reports, which copy for a series of years the figures of cost obtained only in the first of the series.

It is not thought necessary to enter here into a discussion of the theoretical question of what constitutes cost of production. The matter of practical interest is to determine what has been the total outlay made by the farmer in order to place on the market a bushel of the cereal in question. That outlay comprises rent, labor, expenditure for seed, and, perhaps, fertilizer, interest, and taxes on tools and other farm equipment, and also depreciation of the same. Taxes on the land need not be included because they ordinarily fall on the land-owner as such. Rent should not be excluded, as it sometimes is, on the mistaken application of the economic theory that "rent is not an element of cost." This doctrine does not mean that "a tenant farmer need not take his rent into account when making up his year's balance sheet. When he is doing that he must count his rent just in the same way as he does any other expense."

While Mr. Weston's investigation was under way we heard that the *Orange Judd Farmer* was making a similar inquiry, extending it, however, to eight states. The statistician of the journal kindly sent us his data for Illinois—a dozen or fifteen replies in all, I think—for our use. It seemed inadvisable to use these on account of differences in the form of inquiry. The results of the investigation of the *Orange Judd Farmer* have since been published, and the conclusion drawn from them that corn was grown in the season in question at a cost per bushel as low as 6 cents. That is much below the cost arrived at in this bulletin. If we omit rent

the cost per bushel through husking would, according to this inquiry, be about 8 cents.

It should be noted that the corn crop of 1896 was above the average, and that the average yield per acre on the farms reported in the following statistics is 54 bushels.

No addition is made herein for taxes. As said already, in our opinion taxes on equipment only should be counted in, and our data on these were too meagre and uncertain for use. In any event the amount to be added therefor to the cost would probably not exceed 6 or 7 cents per acre, or a little over 1 mill per bushel.

It would be very desirable if a properly conducted inquiry into the cost of production of the leading cereals could be made for a series of years. If undertaken under the direction of competent statisticians some light might be thrown on the vexed question of "the distress of the agricultural classes."

The inquiry of Mr. Weston is as follows:—

Considerable has been said and written about the cost of producing the leading cereals, but only a few really systematic inquiries into the question have been made. These have usually been based upon the estimates of interested correspondents, and not upon the reports of work actually done by those engaged in production. Such reports, while interesting, are, however, of but little scientific value because it is impossible to tell how far they are mere guesses.

In view of the great fall in the prices of farm products, and the wide-spread and prolonged agricultural depression of recent years, the question of cost of production of agricultural products is of great interest and practical importance. The question as to what crops are most profitable, is, of course, the leading one with producers. It cannot be denied that farmers in some sections of the country, being insufficiently acquainted with the problem of cost of production, and not knowing the exact state of the world's supply, have persisted in growing certain kinds of grain when something else could have been produced with much greater profit.

The present investigation was begun in order to secure, if possible, accurate information on the expense of raising the corn and oats' crops of 1896 in the state of Illinois. Before giving the details of the inquiry, it will be interesting to review briefly some previous attempts to determine the cost of production of these grains. Hardly worthy of mention are numerous statements of individual accounts and experiments relating to the subject, to be found in the agricultural

reports of the various states and the United States, running in time throughout the past thirty years.

In 1885, 1886, and 1887 inquiries concerning the cost of producing corn and oats in Illinois were made by the state department of agriculture.* The published results consist simply of a series of tables, without detailed description or analysis. The tables show returns for all the counties of the State, indicate the acreage as returned by the assessors, the yield per acre in bushels, the total yield in bushels, the price per bushel, the value of crop, the cost of production per acre, the total cost of production, and the profit, or loss, on the crop. The data as to cost, from which the tables were compiled, consisted chiefly of estimates by correspondents of the department. There is nothing to show that any separate account was taken of the individual elements which enter into cost of production; and, in fact, there is nothing to show that the cost of production per acre for the counties is anything other than an estimate. The purpose of the inquiry appears to be to show the relation between the value of the crop and the cost of its production. This is done without any apparent consciousness of the fact that in such an account the item of cost of production is of prime importance. The cost of production per acre in the series of tables given in the reports of 1886 and 1887 is practically the same. The few variations that occur are so slight as to be unworthy of notice. It is significant that the Crop Reports give the same figures for cost of production, for every county, year after year.

The next investigation of a similar nature was undertaken by the United States Department of Agriculture in 1898. It was prompted by numerous inquiries relative to the cost of raising our principal cereals. Corn and wheat were chosen as the subjects of inquiry. In the case of corn the items of cost were enumerated as follows: Rent of land, manure, preparing ground, planting, cultivating, gathering, housing, and marketing. The table as compiled shows the average and total cost under each of these items, for individual states, groups of states, and the country as a whole. The results were derived from individual estimates made by over 28,000 practical farmers. These results were checked by replies received from over 4000 experts, who were graduates of various agricultural colleges and engaged in farming.

* *Crop Reports, Ill. State Board of Agriculture, 1886, 1887.*

Further work of this kind has been done by the Illinois Department of Agriculture during the present year, and the results were published in the *Statistical Report of the Illinois State Board of Agriculture* for May. Like previous reports by this department, this is made up entirely of a series of tables, without discussion or analysis thereof, or any explanation of the method of their construction. In fact, the subject is barely mentioned in the beginning of the report where it is stated that, "It is impossible to obtain the exact cost of production, but the tables are prepared from the accounts and estimates of practical farmers, which have been carefully examined, compared and revised before presenting them to the public in this form." It would have added much to the interest and usefulness of the effort if a more detailed account of it had been published. However, the tables show that they have been prepared with some care. A careful discrimination has been made between the different elements which enter into the expense of production. This is an important feature which former investigations of the Department have omitted.

The Present Inquiry.

When the initiatory steps of the present inquiry were taken nothing was known of the work already begun by the Illinois Department of Agriculture. In preparing the circulars to be sent to the farmers of the State an attempt was made to avoid the weaknesses and supply the deficiencies of the earlier efforts of this kind. It was the aim to reach, so far as possible, the working farmers of the State as a class. No discrimination was made in favor of those who are recognized as experts, or profess some special interest in these inquiries. It was deemed that much more trustworthy results would be obtained by seeking information from the farmers in general, because the average conditions in practical farming are more likely to be reached in this way than in any other. In the main, the questions were so arranged in the circular as to follow the order of work in production. The questions do not call for estimates, but for actual expenditures. The questions were made as few as possible, and of such a character that they could be answered easily. Wherever possible, expenditures were asked for in terms of days' labor. The rate of wages per man, and per man and team, was then asked for in order to be applied to the number of days spent in labor. The purpose of putting the in-

quiry into this form was to remove the temptation to make estimates, — a temptation to which one yields more easily when giving answers to such questions in dollars and cents.

There is another advantage of much importance secured by asking for replies in terms of days' of labor rather than of dollars. The men of the family of the farmers doubtless work many days without remuneration in wages such as is accorded hired help. If answers had been requested in terms of dollars some correspondents would doubtless have omitted the cost of that family labor. As the circular was worded, we probably secured a pretty complete return of this labor. Some of the questions proposed have no direct bearing on the cost of production. They were inserted for other purposes. Following is a form of the circular sent out : —

UNIVERSITY OF ILLINOIS,
URBANA AND CHAMPAIGN,

JANUARY 30, 1897.

The University of Illinois is endeavoring to secure accurate information concerning the cost to the farmer of producing corn and oats. Your co-operation is asked in the work. You will confer a great favor by answering the following questions, which refer to the crop of 1896, no matter whether your conditions for that year were favorable or not.

Information of this kind will throw light on our agricultural question, and none can give it better than the farmers themselves. Of course all answers will be treated as confidential.

Name of Township

(A) CORN.

How many acres grown ?

How many days labor actually used in : — (a) Breaking stalks ? (b) Plowing ? (c) Disking ? (d) Harrowing ? (e) Rolling ? (f) Planting ? (g) Cultivating ? (h) Cutting ? (i) Husking ? (j) Hauling to market ?

What was the cost (in dollars) of shelling ?

Was it grown on sod or other land ?

Was it planted by hand or check-rower ?

Was it cut or husked from the hill ?

How many times was it cultivated ?

What was the total yield in bushels ?

If husked by machine : — (a) What was the cost (in dollars) per acre ?

(b) Did the fodder keep ? (c) How did it compare with timothy hay for feed ? (d) How much was baled for market ? (e) What was the price per ton ?

(B) OATS.

How many acres grown?

Was it grown on corn or other land?

How many days labor actually used in : — (a) Breaking stalks? (b) Plowing? (c) Disking? (d) Harrowing? (e) Rolling? (f) Sowing? (g) Cutting and shocking? (h) Hauling and threshing? (i) Hauling to market?

What was the cost (in dollars) of twine used?

What was the total yield in bushels?

(C) What was the rate of wages per man?

What was the rate of wages per man and team?

What was the rent of land per acre?

What is the distance to market?

Name

Eight hundred of the above forms were sent out in February, and about one hundred more at later times to some of the counties which previously made no replies. When the returns began to come in they showed at once that some important points had been overlooked in preparing the questions, while some of the questions prepared were so worded as in some cases to give rise to vague answers. In order to secure some additional information and remedy the difficulties that developed, the following form was sent to 100 of those who had made replies : —

1. Number of horses used in : — (a) Plowing? (b) Disking? (c) Harrowing?

2. Cutting and shocking oats : — (a) Number of days? (b) Number of men? (c) Number of horses?

3. Hauling and threshing oats : — (a) Number of days? (b) Number of men? (c) Number of horses?

4. Cost of seed : — (a) Corn? (b) Oats?

Name

Township

County

Of the 900 of the original circulars distributed, 316 were returned with answers, and of the second form nearly all. Considering the nature of the inquiry and the fact that the circulars were sent to all classes of producers in every part of the State, this is held to be a very excellent showing. About 15 per cent of the replies were accompanied by letters in explanation of some parts. Many useful suggestions were contained in these, and some information was gained that could not well have been obtained in answers to questions.

When the replies were examined some counties were proved to be largely represented, while others were not represented at all. In sending out the circulars an effort was made, as has been said, to distribute them as equally as possible over the territory of the State. The fact, then, that some counties show no returns is to be attributed largely to the agricultural conditions which prevail. An inspection of the tables will show that these counties are mainly in the southern group, where, generally speaking, corn and oats are not the staple products. Furthermore, a study of the Crop Reports of Illinois in recent years, and of the United States census reports for 1890, with respect to the acreage and production of corn and oats in the counties of Illinois, shows that those counties from which the largest number of replies came to our inquiry are the ones in which these grains are most largely grown.

An analysis of the returns reveals the fact that while there is great uniformity in the answers to some of the questions asked, in the answers to others there is considerable variation. This was to be expected, since in different localities the elements which enter into cost of production are necessarily different. This fact indicated the method for compiling the data. It was determined to take account of the constant elements first, to compute the expense of production up to the point where differences appeared in the character of the constituent elements of expenses of production, and then to make whatever additions were necessary to include the variable factors. An examination of the replies showed that, with the exception of cutting, shelling, and hauling to market, the elements comprising the expenses of production were very uniform in character. It was decided, therefore, to find the expense of production first excluding these three elements, and then to add the necessary amounts for these items separately.

Of the 316 replies 274 were used in constructing the tables on corn. The others either failed to give reports on corn, were incomplete, or for some reason was deemed unreliable. It was not thought necessary to insert the individual replies. Accordingly Table 1 shows the returns by counties. The elements of expense of production as far as and including husking are labor, rent of land, and seed. The sum of these three was found for each individual reply, and the sum of these sums gave the total of the county. This divided by the total number

of acres or bushels represented in the replies, gave the expense per acre and per bushel, respectively. The average additional expense per acre and per bushel due to the three variable elements was then determined separately for each county and added to the average previously found. The result was the total cost per acre and per bushel for the county, so far as determined by the elements taken into account.

The number of replies which gave expense for seed was 59. These were used to obtain the average for the State. As calculated from table 6 it is .065 per acre, or .455 per bushel planted. The average amount of seed to the acre was estimated at one-seventh of a bushel.

Frequently some of the items, as the rate of wages or the rent of land, were omitted in the replies. Their places were filled by taking an average of the returns obtained from the same county. Throughout the investigation the rate of wages per man and team, when it was not given, is estimated at double the rate of wages per man. The rent of land was not always given in dollars, but occasionally as some fractional part of the crop. A proportionate amount was then subtracted from the number of acres and bushels returned, and the total expense, excluding rent, divided by the remainder, giving the expense per acre and per bushel. For instance, in one reply the rent of land is given as one-half of the crop, the number of acres 60, the number of bushels 3000, and the cost, exclusive of rent, \$259.90. Dividing this cost by one-half the number of acres and bushels we have \$8.66 and \$.173 for the cost per acre and per bushel, respectively. On account of this irregularity, the average rent per acre for the counties multiplied by the number of acres reported will not always give the total rent for the counties. The average rent per acre for the counties is the average of the returns which were given in *money*.

Of the 316 replies received to the questions only 170 were available in compiling the tables concerning oats. A larger number failed to report on oats than on corn, and a great many were so confused on some points that their answers were evidently unreliable. In computing the average cost here the same method was pursued as before. The expense of production was first found so far as the uniform elements were concerned, and additions made to the county averages for the variable factors. Only one variable element, how-

ever, appears in the case of oats, that of hauling to market. With one exception, the same irregularities occur in the individual returns as in those on corn, and the same points are to be noted regarding them. The exception consists in an estimate made in some of the returns with respect to the days of labor spent in cutting and shocking, and hauling and threshing. There were many replies in which the number of men and teams used in cutting, shocking, hauling, and threshing was not given, although the time taken to perform these operations was given. In order to supply this omission and render usable many replies which were otherwise excellent, the average number of men and of men and teams used in these two kinds of labor was determined from those replies in which definite answers were given. These averages were then applied in all those cases where some definite time was given for performing the work. The cost of seed was computed in the same manner as in the case of corn, and is 50 cents per acre, or 20 cents per bushel. The average amount of seed to the acre was estimated at two and one-half bushels.

General Considerations Affecting the Statistics.

Before analysing our results and comparing them with those of former investigations it will be necessary to take notice of some factors in cost of production that do not appear in the circular, as well as of some things produced which are not accounted for in the number of bushels of grain reported.

First, there is the annual interest on the capital invested in machinery, horses, etc., together with the depreciation of the same, which are necessarily parts of cost. This interest is not to be added to the cost of each crop, but is to be distributed among all the crops of the farm in proportion to the amounts of time during which the fixed capital was used in the production of the respective crops. It is difficult to determine the amount to be placed to the account of each.

In the second place, there is sometimes considerable capital invested in fertilizers. This is not all to be added to the cost of the first crop which is grown after the treatment of the soil, as is commonly done, but, rather, it should be distributed over successive crops as long as its beneficial effects endure. How this apportionment should be made is also difficult to determine.

Further, it is not contended that the labor processes taken account of in the circular constitute all the labor that enters into production. There are many days' work done about a farm, as in the destruction of noxious weeds, the repairing of fences, etc., in order to keep it in the best conditions for production, which must be made a part of the cost of all crops affected thereby.

Finally, in the case of oats the cost of the use of the threshing machine and that of coal are to be added to the average expense as determined in the tables.

On the other hand, the fact must be kept constantly in view that the labor and capital invested have produced some values in addition to the number of bushels of grain. In the case of corn there are the stalks, or fodder, usually worth something, and frequently considerable. In the case of oats there is the straw, which always has a value. Frequently other things are grown with both corn and oats with little or no additional labor. For instance, clover is commonly sown with oats and used for pasturage after the oats are harvested, or plowed under for a fertilizer. It is particularly to be emphasized that, when any attempt is made to determine the *profits* arising from the production of a crop, the value of these complimentary products must be taken into consideration.

Analysis of the Tables — Corn.

Table 1 presents the returns for corn by counties. It shows that of a total of 102 counties 76 are represented in the replies. This is 74.5 per cent. A careful examination of the counties from which replies were most numerous shows that the "corn counties" are very well represented. It is probable, therefore, that the averages need no correction for unequal distribution of replies. The total number of acres represented by the replies is 16,603. The corn acreage of the State in 1896 was 6,881,400. The total number of bushels represented is 896,235. The total crop for that year was 288,616,334. As has been said, the cost of production as far as, and including, husking was first worked out, for the reason that the other items of cost did not appear in all of the replies. Taking the figures as they stand, it appears that the lowest cost per bushel is in Edgar county, 11.3 cents; the highest in Edwards county, 38.8 cents. The average for the State is \$8.72 per acre and 16.1 cents per bushel.

In addition to the expenses of production thus far discussed there are certain other items which, as has been said elsewhere, should fairly be included. Something needs to be added for depreciation of equipment and for interest on investment in equipment; something more for the cost of keeping teams when idle through the winter, and also something for wages of the men when the weather is so bad that they cannot work. It is difficult to estimate these items, but we may perhaps get at the matter in some such way as this:—

The cost of equipment will perhaps average about \$250.00* for every 40 acres. If we allow 10 † per cent for deterioration and 6 per cent interest, it will be necessary to add about 1.8 of a cent per bushel to the cost of the crop of the year that we are considering. Per acre the amount will be \$1.00. If we allow 5 per cent of time lost we must add also, to get our total cost, 4 mills‡ per bushel, and 21 cents per acre. Allow \$15.00 as the cost of keeping a team 5 months on the basis of \$1.50 per month per horse for pasturage. One-half of this, \$7.50, may be placed against oats and corn when they are the leading crops. If we allow one team for every 40 acres we must add 1.7 mills per bushel and 9 cents per acre for this item.

Finally, something should be allowed for the cost of cribs. The original cost of these is about 2 cents per bushel capacity, and a crib will ordinarily last about 12 years. We must therefore add for this item about one-sixth of a cent per bushel to our cost. This gives us, per bushel, 18.6 cents, and, per acre, \$10.10.

As against the items of a general character on account of which we have added to the cost as shown in the table, there are certain other items that must be regarded as lessening the cost obtained. In the first place, during the period of growth of the crop both men and teams are likely to spend considerable time in other work than that involved in the original crop. How much should be allowed for this

* Team, wagon, and harness, \$170.00; plow, \$12.00; harrow, \$11.00; planter, \$40.00; cultivator, \$18.00; disk, \$28.00; roller, \$20.00. Total, \$299.00. If we assume that one harrow, planter, disk, and roller will do for 80 acres, we must deduct half the price of each, leaving \$250.00. If stalks be cut by machine, \$21.00 or half the price of cutter should be added to make equipment complete.

† It is not meant that the equipment needs replacing only once in ten years, but that so far as depreciation is caused by use in corn raising ten per cent per annum is a fair allowance.

‡ Total days labor man and team, through husking + No. }
$$= \frac{37079}{896238} \times .05 \times \$2.12 = .004$$

bushels \times .05 \times average wages of men and team,

it is impossible to say. Perhaps, however, it would offset the amount added on account of idleness during bad weather. Of more importance than this is the value of the by-products. The principal one is the stalks, which often serve as fodder. The value of this fodder must, of course, be deducted from the gross cost already figured out. We may estimate it at 1 cent per bushel,* or 54 per acre. Making these deductions we get 17.3 cents per bushel and \$9.35 per acre. If the reports recently made public concerning the availability of the pith of corn-stalks for use as cellulose in naval and other construction are borne out, the value of the corn-stalk as a by-product will be greatly increased.

How much, now, must we allow for what we have called the non-uniform elements of cost of production, namely, shelling, hauling to market, and cutting?

It is a question whether the cost of any of these operations should be included in the expense of producing corn. They certainly are not to be included in those cases where the corn is fed in the ear to hogs or stock. Cutting, at least, as has been said, is not properly counted an item of cost at all, especially since, in most cases, breaking and plowing in the stalks have already been allowed for. Moreover, the cost of cutting would doubtless be more than offset by the value of the stalks for fodder. Hence the cost of cutting need not be included, although it is of interest to determine how much it is. The total number of acres cut was 1510, and their yield was 79,826 bushels. The number of days' labor required was 1059. At the average wages of \$1.06 per day, we get 74 cents per acre, and .014 cent per bushel, as the average cost. The amount of stalks which supply on the average one bushel of grain took .018 of a day to cut.

Turning, now, to shelling and hauling, a true, mathematical, average cost of production for the whole crop would perhaps require us to determine the average cost of each of these processes for the quantity to which each of them was actually applied, and then to add to the average cost of the whole crop, through husking, such proportions of the cost obtained for shelling and hauling as the amounts shelled and hauled bear to the whole. Such an average, however, would be ideal. It would have no actual cost to correspond to it, and so would be of no interest. The practical question is: What

*The figure of the *Orange Judd Farmer*.

does it cost on the average, per bushel and per acre, to raise corn and deliver it at the elevator? Accordingly, we add to the total cost thus far obtained the average cost of shelling and of hauling as calculated from the figures obtained from those who reported shelling and hauling. Of the whole amount of corn reported 312,426 bushels were shelled from 5638 acres. The total cost of shelling was \$2,985.93, or 9 mills per bushel and 52 cents per acre. The range of cost of shelling per bushel was from a quarter of a cent to two cents. Each of these prices applied to only a single report. The great majority of replies were pretty close to the average.

The number of bushels hauled to market, shelled and unshelled, was 311,345 from 5561 acres, and the hauling took 1922 days' labor of one man and team. At \$2.13 per day this amounted to \$4093.86, or .018 cent per bushel, and .73 cents per acre. The average distance was 3.2 miles, and the average load 162 bushels. Hence the cost of hauling one bushel one mile was 4 mills. Adding these items we get a final cost per bushel of 19.5 cents, and per acre of \$10.59.

Making all allowances it would seem proper to accept these as fair figures for the cost of production per bushel and per acre of the corn crop of Illinois in 1896. It will be seen that this result differs materially from those given in the United States reports and in the Crop Reports of Illinois. It must be borne in mind, moreover, that this is the expense of production per bushel and per acre *for the crop of a single year*. It would be absurd to regard this cost as correct for any other year. The figures could not be quoted therefore for 1897, and still less for a period 10 years from now.

It is important to emphasize exactly what this cost represents. It is not the cost of the *growing* merely. As has been indicated, it is the average sum of the expenditures on all the processes involved in production from the preparation of the soil to the delivery at the elevator, including the wages of the farmer himself, whether owner or renter; a proper allowance for time lost, and for maintenance of team during idleness; interest on investment, including rent, and allowance for depreciation of tools and machinery. Anything received for corn above this cost represents pure profit in the economic sense.

Certain other items of interest may be gleaned from the tables. The average number of acres devoted to corn on the farms reported was 60.6. The total amount paid out in rent was \$64,333.26.*

* This includes the estimated amounts of rents paid in produce, on the basis of the cost of the produce, and makes an average of \$4.00 an acre.

Oats.

After what has been said about the tables on corn, little need be said about those on oats. On the face of the returns the cost of production for the year in question was, up to the stage of hauling to market, 17.8 cents per bushel, and \$6.59 per acre. Of these amounts 5½ cents and \$2.07 went for labor, per bushel and per acre, respectively; 10 cents and \$3.80 for rent; 1.4 cents and 55 cents for seed; and half a cent and 19.6 cents for twine.

The amount of oats hauled was 153,356 bushels from 4031 acres for an average distance of 3.2 miles. The work took 684 days and cost \$1491.12. This makes 37 cents per acre, and 9 mills per bushel.

The amount to be included for depreciation and interest in the case of oats may be estimated at about 2.2 cents a bushel and 80 cents per acre. This gives us a final average of 21 cents per bushel and \$7.76 per acre for the cost of oats delivered on the market in the season of 1896. This is a larger per bushel cost than is shown for corn and will strike the reader as strange; but it is accounted for by the low average yield. According to the tables the yield of oats was 34 bushels to the acre, which is considerably below the average; while that of corn was 54 bushels, or somewhat above the average. If the oats had shown as high a yield per acre as did the corn their cost per bushel would have been only 14.4 cents.

The lowest cost per bushel was in Cass county, 11.9 cents; the highest in Moultrie county, 58.2 cents. The lowest per acre cost was \$4.61 in Bond county; the highest \$10.47 in Boone county.

In table 3 the counties are grouped as northern, central, and southern. The grouping is the same as that made for the purpose of holding terms of the supreme court. The table shows in small compass the relative costs of production in the divisions of the State and enables comparison of results to be made with those of the State Department of Agriculture for the same groups.

Conclusions.

A comparison of the results of the present inquiry with those of previous ones shows that the averages in the present inquiry are considerably lower. This is true particularly of the average cost per bushel. In the case of corn the cost per bushel as determined by the Illinois Department of Agriculture in 1886 was 42 cents, and by the

United States Department of Agriculture in 1893, 38 cents; while in the present investigation it is only 19 cents. The differences in the cost per acre, although considerable, are not so striking. It is of course to be expected that the cost per bushel will vary considerably from year to year, the yield depending very much on the seasonal conditions. However, an examination of the tables put forth by the Illinois Department of Agriculture in 1886 and 1887 leads to the conclusion that the Department's estimates of the yield per acre are too low. As said before, the main object of these tables seems to have been to show the relation between the value of the crop and the expense of production. According to the tables there was a loss of about \$20,000,000 on the corn crop of 1886, and about \$17,500,000 on the crop of 1887, there being a total yield of 182,500,000 bushels in the former year and 129,500,000 in the latter. This would be a loss of 10 cents per bushel in 1886, and 13 cents in 1887. It is hard to believe that the farmers in Illinois were losers to such an amount in those years, or that the price of grain fell so far below the cost of production. Of course no one can deny that the price of grain may fall below the cost of production, but it is not likely to fall very much below, and we cannot suppose that it will do so for many successive years. The same criticism must be passed upon the report of the United States Department of Agriculture. The average yield per acre is probably much greater and the cost of production per bushel much lower than the estimates in these reports.

In the case of oats the table given out by the Illinois Department of Agriculture in 1886 places the cost per bushel at \$.288, while the present investigation shows it to be \$.184; but there is also an equal discrepancy in the cost per acre, which is \$9.80 in the one case and \$6.83 in the other. As to the estimate of the yield per acre and its effect upon the average cost per bushel, precisely the same things are to be noted as were noted concerning corn. Further, it must be concluded that the average cost per acre as determined by the Illinois Department of Agriculture in 1886 was too high. The county averages in the present inquiry are almost uniformly lower than those of the Department. This, of course, would very materially reduce the average cost per bushel.

A comparison of the results of this inquiry with those of the State Department of Agriculture in 1897 shows that the averages for the State are nearly alike, with respect to corn.

The average for oats as determined in the present inquiry is about \$2.00 less than that of the Department. It should be noticed also that county averages are almost uniformly less. After allowances are made for any elements of cost that do not appear in this investigation, it must still be concluded that the averages published in the recent report of the Illinois Department are too high.

Generally speaking, the results of the inquiry tend to prove that the average cost of production, and particularly the average cost per bushel, is much less than commonly thought. It has always been a puzzle for people to make the customary market price of grain agree with what was the supposed cost of production. It may be unhesitatingly asserted that when all complementary products are accounted for the average market price of grain will rarely fall below the cost of production, and then only for brief intervals.

It would be interesting, if possible, in the comparison of different inquiries of this kind, to note whether there has been a gradual decrease in the cost of production due to improvements in machinery and methods. But the data upon which such a conclusion would have to be based are too meagre and untrustworthy. Satisfactory conclusions in this direction could only be reached by a series of careful investigations extending through a number of years.

Cost of Seed.

Table 4 shows the data from which the average cost of the seed was computed.

REVIEWS AND MISCELLANY.

MIGRATION OF COLORED POPULATION.

To the Editor: —

In the December number of your quarterly a notice of my pamphlet on *The Northward Movement of the Colored Population* points out a source of error which, when properly allowed for, would lead, as your reviewer suggests, to a change in the figures given (at pp. 15 and 18 of pamphlet) to indicate the extent of that movement. I think I can show (if you will allow me the space) that such change would be but a small one.

The source of error is as follows: In table No. 28 of the Eleventh Census, which gives "Native Colored [including Indian] Population, distributed according to State or Territory of Birth," etc., there is a column for "Born in the United States (State not specified)," while in the corresponding table of the Tenth Census there is *no such column*, and your reviewer correctly intimates that I failed to allow for this omission in that census.

By that (1890) column it will be found that the number then *living in the North*, of colored (including Indian) population, who were returned as natives of the United States, but who failed to give the State of their birth, was 12,417. On a careful examination of the figures (especially noting the figures for some of the Western States and Territories) it will seem certain that as many as 2000 of these were Indians, which would leave 10,417 as the number of native negroes who failed, etc. Now, how many must we take as the number who failed, etc., in 1880? Plainly, the nearest conjecture we can make is by a rule of three calculation. *As* the number of native (United States born) negroes in the North in 1890 (570,120) *is to* the number of same in the North in 1880 (472,556), *so* the number failing, etc., in 1890 (10,417) *is to* the number failing, etc., in 1880; which number will be found to be 8634.

But next, these 8634 were not *omitted* by those who made up Table xxix in the Tenth Census, -- as the footing up of the totals clearly shows. They were tabulated as coming from *somewhere* in the United

States. And where was that somewhere? Undoubtedly they were tabulated as "born in" the State where they were living. [I venture to treat the strong probability as a certainty, and this raises to its maximum the error which your reviewer has pointed out.] For instance, in Indiana the few hundreds of American-born colored (negro) population who failed to give the State of their birth were undoubtedly placed *among* the 89,359, who are given as "born in Indiana," and so, of course, in every other State. The result, accordingly, was that in 1880 about 8684 negroes living in the North were put down as born in the *North* when they ought to have been tabulated as "born in the United States (State not specified)."

But next,—where must we suppose that these 8684 were in fact born; that is to say, how many of them must we suppose to have been southern-born, and how many northern-born? The total number of American-born negroes living in the North in 1880 was, as already mentioned, 472,556, made up as follows:—

Tabulated at random as northern-born, . . .	8,684
" correctly " " " . . .	283,386
" " " southern-born, . . .	180,586

and it is very clear that the best we can do with the doubtful 8684 is to distribute them proportionately between the two sections, thus:—

Probably born in the North,	5,273
" " " " South,	3,361

We find, then, that after making allowance for the omitted column in Table xxix of the Tenth Census, the total of southern-born colored (negro) population living in the North in 1880 should be not 180,586 (as given at p. 18 of pamphlet) but 183,947. A *very* small conjectural addition should for similar reasons be made to the number given for such northern-born population living in the South in 1880, which should be not 14,039 (*loc. cit.*) but 14,148.

The final result (after allowing, of course, for a probable death rate) is a change of only 2600 in balance of movement of the colored population from the South to the North during the decade; that is to say, the net gain of the North would be 79,000 instead of 81,600 (as stated at p. 15 of pamphlet).

There is in my pamphlet another source of very slight error, in a failure to allow for a small number of *foreign-born* colored (negro)

population in the North. (In the South, as a whole, the number is so extremely small both absolutely and relatively as to be of no statistical importance.) With your permission, I will state a few results — and very briefly — under this head.

Of this foreign-born population there were, in 1890, 10,768 in the North and 7898 in the South. The number at the North was increasing, and somewhere about 3500 moved in to the entire North during the decade. Massachusetts has a larger number of this class than any other northern State, 2632 in 1890. Florida had in 1890, 4682, probably for the most part from Cuba, and their number was increasing their movement into the State during the decade, being apparently about 2800. This foreign immigration calls for a change in the estimate made (page 15) of the rate of natural increase (in ten years) of the Florida negroes, reducing it from 25 per cent to about 22.6 per cent. In the other southern States the foreign born negro population is utterly insignificant and was decreasing. There is probably no colored emigration to foreign countries worth considering from any part of the United States, and in making calculations as to movement I have assumed — almost necessarily, for there are no attainable data on the subject — that there is none at all.

The fact that the North gained more than 8000, say perhaps 3500, of this population during the decade, more than offsets, when we are calculating the rate of natural increase in the North, the error of 2600 in the northward movement from the South. It is still very clear that the colored population of the North grows little (perhaps about 3.5 per cent in ten years) through natural increase, and that its principal growth is through influx from without.

FREDERICK J. BROWN.

Baltimore, February 26th, 1898.

NATALITY IN MASSACHUSETTS.

Essai sur la natalité au Massachusetts. By Arsène Dumont. Nancy. Berger-Levrault et Cie. 1898.

This extremely interesting monograph of 40 pages is an extract from the *Journal of the Statistical Society of Paris*. The writer has given much attention to the subject of the birth rate of France in his

earlier publications. In his *Depopulation at Civilization* he refers, on page 71, chapter 4, to the low birth rate of the New England States; and in his efforts to explain the low birth rate of his own country he has found certain conditions prevailing in Massachusetts which afford a partial explanation.

The intense energy which is characteristic of the American he attributes to the effect of immigration, which has a tendency to increase the numbers of persons of the healthy, vigorous age of life (15 to 60 years). The percentage of this class in Massachusetts has gradually increased from 60.57 per cent of the total population in 1865 to 64.98 per cent in 1895.

A series of twelve excellent tables is presented showing the movement of the population for a series of years. Special prominence is given to the subject of fecundity of marriage. In table D, on page 13, the figures presented upon this point are generally too low in consequence of the defective method employed. The births in each year are compared with the marriages of the same year, and, while this method will produce fairly correct results in a nearly stationary population, as in France, where the annual growth of the population in 40 years has been less than $\frac{1}{3}$ of one per cent, it cannot produce correct results in a rapidly growing population like that of Massachusetts, where the mean annual growth has been over two per cent. Dr. Farr and other foreign authorities were accustomed to compare the mean births of a group of years with the mean marriages of a group of years six years earlier. Dr. Wilbur of Michigan assumes a period five years earlier, and this is probably very nearly correct for a Massachusetts population.

The following figures from M. Dumont and from the *Twenty-eighth Annual Report of the State Board of Health of Massachusetts*, p. 731, show the differences obtained by the two methods:—

FECONDITY OF MARRIAGE — MASSACHUSETTS.

Period.	Dumont's Tables.	State Board of Health.	Difference.
1851-55	2.5	2.8	0.3
1856-60	3.0	2.7	— 0.3
1861-65	2.7	3.1	0.4
1866-70	2.5	3.0	0.5
1871-75	2.9	2.7	— 0.2
1876-80	3.1	3.5	0.4
1881-85	2.9	3.1	0.2
1886-90	2.8	3.4	0.6

M. Dumont has treated the subject from the standpoint of the philosopher and political economist. He draws a correct picture of American social life, and concludes that the six hundred millions of population predicted as the population at the end of the next century cannot be attained in the United States under the present conditions.

S. W. A.

STATISTICS OF INFIRMITIES IN NEW ZEALAND.

In the New Zealand census taken April 12, 1896, instructions were given to make a record of all persons unable to follow their usual occupation by reason of sickness or accident, as well as of those afflicted with certain infirmities. This latter class included the deaf and dumb, blind, lunatics, idiots, epileptics, paralytic, crippled and deformed, debilitated and infirm. The results of the investigation show that 9.94 in every 1000 were suffering from sickness or accident on April 12, 1896, using the word sickness as inability to work on that day, and that besides this there were 7.89 per 1000 in the other classes referred to above.

In 1891 returns from New Zealand and New South Wales for the above classes (sickness, accident, and infirmity) combined were, per 1000 living, as follows:—

	New Zealand.	New South Wales.
Persons	17.83	19.79
Males	20.92	22.90
Females	14.36	16.18

It will be observed that there is a marked difference in favor of females. For males after the period of 35-40, the proportion of sickness rises steadily at each quinquennium of age, while the proportion of accidents is higher at the period 65-70. The rate of sickness per 1000 males living at 35-40 was 5.46, and this increased to 19.08 to 55-60, to 43.66 at 65-70, and to 77.39 at 80 and upwards. In regard to females the sickness is not so great at 30-35 years as at 25-30, but from 35-40 it increases, and from 55-60 very rapidly, though the numbers on which the proportions are based from this time onward are small. The statistics for lunacy show that there is a steady increase. In 1896 one person in every 320, exclusive of Maoris in New Zealand, was afflicted with lunacy.

PROPORTION OF THE SEXES.

An exception to the general rule for male births to exceed female births is found in the native races of the colony of the Cape of Good Hope.

Taking the figures for the colony proper for 1896 the following percentages are given : —

Race.	To each 100 girls.	To each 100 boys.
European	102.37 boys or	97.69 girls.
Hottentot	104.16 " "	96.01 "
Fingo, Kafir, and Betchuana	99.66 " "	100.35 "
Malay	102.54 " "	97.52 "
Mixed and other	104.31 " "	95.87 "
All races,	102.15 " "	97.90 "
Other than European,	102.02 " "	98.02 "

Placing the figures above quoted alongside of those given in the census table the following interesting comparison is given : —

Race.	Females alive, 7th April, 1891, to every 100 males.	Females born in 1896 to every 100 males.
Hottentot	91.97	96.01
European	92.38	97.69
Fingo, Kafir, and Betchuana	101.86	100.35
Mixed and other	101.13	95.87
Malay	107.17	97.52

A comparison of the census results for 1891 and 1875 as regards the old colony, *i. e.*, excluding Griqual and West and the Transkeian Territories, proves that the number of females to every 100 males of each race (except in the instance of the Malays) has increased two and a half per cent for Europeans, Fingoes, mixed and other, including Hottentots, and one-half of one per cent for Kaffirs and Betchuanas.

VITAL STATISTICS OF WEST INDIES.

Jamaica. Annual Report of the Registrar-General for the Year ended 31st March, 1897. From the General Register Office, Spanish Town, November 29, 1897, pp. 44.

This report is unusually valuable because it presents vital statistics from other colonies in the West Indies, and the registrar, Mr. S. P. Smeeton, hopes to make these comparative reports more perfect, thus presenting a "complete summary of vital statistics for the West

Indies." It is to be hoped that this very desirable object will be attained. In the following table some recent data for Jamaica and other colonies are given :—

Colony.	Year.	Rates per 1,000 Population.			Illegitimate Births. Per Cent.
		Marriages.	Births.	Deaths.	
Jamaica.....	*1896	4.6	38.8	23.7	60.8
"	*1897	4.3	38.5	22.1	61.1
British Guiana.	1896	..	28	29	72.6
Trinidad.....	1896	5.94	33.7	26.5	58.1
St. Lucia.....	1896	6.09	40.4	22.4	60.38
Grenada.....	1896	5.30	44.93	30.80	49.50
Bermuda.....	1896	..	32.6	21.7	13.2

*Year ended March 31st.

The very high percentage of illegitimate births naturally evokes the most serious attention from the registration authorities. They say that "so long as the present irresponsibility is possessed by those who cause this stream of social impurity to flow over the land, nothing better can be, indeed worse must be, expected." The remarks of Mr. Frederick L. Hoffman on the "Negro in the West Indies" * are quoted with approval.

CRESSY L. WILBUR.

MORTALITY OF NEGROES.

To the Editor of Quarterly of Statistics :—

In your December number a brief notice of the *Sixth Biennial Report of the North Carolina Board of Health* says: "In a former report it was stated that, contrary to the usually accepted opinion, the negro was less susceptible to malarial diseases than the white man. The reports showed the death rate from that disease to be two and a half to one as against the negro. This fact has only been emphasized by the more accurate report for 1896," etc.

Allow me to correct an inaccuracy in the first sentence above quoted. What the report under review really says is: "In our last report . . . we also adverted to the fact that, contrary to the usually accepted opinion, that the negro was less susceptible to malarial

* *Publications American Statistical Association*, June, 1896.

diseases than the white man. Our reports showed the death rate to be two and a half to one as against the negro," etc., as above.

It is more important, perhaps, to point out that the mortuary statistics in the report are made up only from returns made by certain named cities and towns. "Our vital statistics continue meagre, reports being made only by cities and towns," etc. . . . The few remarks which follow (including the passage quoted) are based on this table. Now less than 10 per cent of the total colored population of North Carolina is found in the cities and towns which have a population of 2500 or more, and from two of these towns (given in the table in the Report) no deaths (of white or colored) from malarial fever are reported, while it is altogether probable that there were no such deaths in Asheville, the returns from which town, however, are not found in the Report, so that the number of urban negroes exposed to malarial influences is but small compared with the total colored population of the State. It is very possible that while a greater population of the colored urban than of the white urban population dies of malarial diseases, at the same time the rural negro may be less susceptible to them than is the rural white man. That the negro in an average malarial country district of the South is less susceptible than the white man to such influences is the view still held very firmly, I believe, by the great majority of southern physicians, although, unfortunately, accurate statistics on this important question do not seem to be attainable.

F. J. B.

OPERATION OF POLL TAX IN IOWA.

In the *Seventh Biennial Report of the Bureau of Labor Statistics of Iowa, 1895-96*, some interesting data are given in regard to the operation of the poll tax in Iowa. In Des Moines there are supposed to be over 10,000 liable for this tax, of which, in 1895, 18 paid it in cash, 4811 worked out the tax. In 1896, 47 paid it in cash, and 4280 worked it out. It cost the city \$2500 to collect the tax for each year. Three dollars was the sum to be collected from each able-bodied male citizen between the ages of 21 and 45.

In Sioux City, 2979 persons are liable for this tax. In 1895, 300 of them either paid or worked out the tax, and in 1896, 388 did the same. In 1896 it cost \$240 to collect the tax.

In Burlington 3000 persons are liable for the tax. In 1896, 2325 either worked out or paid the tax. It cost the city \$237.75 to collect the tax.

In Ottumwa there is a voting population of 4600. The tax levied is \$2.50 per year. Deducting one-third not liable, from the fact that they are either too old or physically not able to perform a day's labor, there would be left a population liable for the tax of 3067. In 1896, 1407 paid or worked the tax with \$1660 turned over for collection to the county treasurer.

In Council Bluffs the number of persons liable is about 2000. Of this number 861 paid the tax in money or worked it out, in 1896.

In Dubuque, Cedar Rapids, and Keokuk no attempt was made to collect the poll tax.

The total number of persons liable for poll tax in the five cities under consideration is estimated to be 21,146, of which, in 1895, 9283 paid the tax, and in 1896, 9308. "It will be readily seen that considerable less than 50 per cent paid the tax. A law that cannot be applied to more than 50 per cent of the people it is supposed to govern is not a good law and ought to be repealed. In all the cities enumerated will be found the old worn out men and crippled working upon the streets as proxies, yet the law especially stipulates that none but able-bodied men between the ages of 21 and 45 shall perform this labor. There are men in many of the cities under consideration who carry around with them certificates from physicians to the effect that they are not physically able to perform manual labor, yet they are allowed to work out some man's tax who cannot perform such work."

ATHLETICS AND SCHOLARSHIP.

In the *Annual Report of the Provost of the University of Pennsylvania*, 1897, an attempt is made to analyze the relations of athletics to scholarship, as illustrated by the experience of that university. It appears that the number of conditions per student conditioned in the *first term* was:—

	Regulars.	Specials.	Partials.
For all students	1.69	1.7	1.6
For members of athletic teams . .	1.7	1.0	2.5

In the *second* term the same tables show : —

	Regulars.	Specials.	Partials.
For all students	1.9	3.1	2
For members of athletic teams . .	2.1	0.0	2

Considering regular students only : In the first term 155 conditioned out of a total of 499 ; in the second term 135 conditioned out of a total of 457.

Of athletes we find in the first term 24 conditioned out of a total of 45 ; and in the second term 16 conditioned out of a total of 45.

"These figures again represent the most favorable enumeration for the athletic class of students, as no attempt has been made to sift out of the total number of 45 those who may have figured solely in the contests peculiar to either term."

During the session 1896-97 there were also 926 students in attendance upon instruction in the Department of Medicine, and of these, according to a report furnished by the Secretary of the University Committee on Athletics, based upon the records of the Committee up to April 7, 1896, 211 students were candidates for positions on athletic teams under control of the University Committee on Athletics, and 714 students of the department were not candidates for positions on the various athletic teams. The average scholastic standing of the students who were not candidates for positions exceeded by 3.1 the scholastic standing of those who were candidates for positions upon the teams. "In this connection, however, it should be stated that in the experience of the Department of Medicine that, with few exceptions during the past several years, the students who were actually athletes, and were recognized as such by the Committee on Athletics, were diligent students and held good scholastic standing in their classes."

TABLE SHOWING THE SCHOLASTIC STANDING OF CANDIDATES AND NON-CANDIDATES
(DEPARTMENT OF MEDICINE) ARRANGED BY CLASSES FOR POSITIONS ON
ATHLETIC TEAMS.

	Number of candidates.	Scholastic standing of candidates. Per cent.	Number of non-candidates.	Scholastic standing of non-candidates. Per cent.
First-year class.....	70	73.2	215	76.3
Second-year class ..	76	75.3	174	80.3
Third-year class...	50	71.8	191	78.8
Fourth-year class ..	15	73.5	134	70.8

Scholastic standing of 714 non-candidates, 76.5 per cent ; scholastic standing of 211 candidates, 73.4 per cent.

AGES OF STUDENTS ENTERING COLLEGE.

In the *Annual Report of the President of the Massachusetts Institute of Technology* statistics are given showing the ages of students at entrance. The table is as follows:—

AGES OF STUDENTS ON ENTRANCE.

Period of Life.	1896-97.		1897-98.	
	Half-year groups.	Yearly groups.	Half-year groups.	Yearly groups.
16 to 16½ years.....	2	..	1	..
16½ to 17 ".....	3	5	1	2
17 to 17½ ".....	19	..	16	..
17½ to 18 ".....	40	59	33	49
18 to 18½ ".....	52	..	45	..
18½ to 19 ".....	44	96	39	84
19 to 19½ ".....	41	..	58	..
19½ to 20 ".....	28	69	26	83
20 to 20½ ".....	23	..	26	..
20½ to 21 ".....	9	32	9	34
21 to 22 ".....	..	11	..	9
	....	272	....	261

In the preparation of the above table two students repeating the first year and sixteen of unusual ages were omitted.

From the foregoing it appears that the average age on entrance is eighteen years and eleven months.

There are also presented the ages, at graduation, of the class leaving in June, 1897. The one hundred and seventy-six members of the class were distributed among the different periods of life as follows:—

Between 20 and 20½	1
" 20½ " 21	11
" 21 " 21½	18
" 21½ " 22	26
" 22 " 23	59
" 23 " 24	36
" 24 and over	25
Total	176

57] *Production and Consumption of Alcoholic Beverages.* 57

THE PRODUCTION AND CONSUMPTION OF ALCOHOLIC BEVERAGES.

A *Memorandum* recently prepared in the Commercial Department of the Board of Trade of Great Britain (summarized in the *Board of Trade Journal*, vol. 24, p. 18) shows the production and consumption of alcoholic liquors in the chief European countries and in the United States. The returns have been compiled from the various official statistics issued by the governments of the different countries referred to, supplemented in many cases by information specially furnished by the various statistical bureaux.

The following statements show the consumption of wine, beer, and spirits, together with the proportion per head of the population, in the latest years for which the data are available, in the United Kingdom, France, Germany, and the United States:—

WINE.

Years.	United Kingdom.		France.		Germany.		United States.	
	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.
	<i>Gals. Thousands.</i>	<i>Gals.</i>	<i>Gals. Thousands.</i>	<i>Gals.</i>	<i>Gals.</i>	<i>Gals.</i>	<i>Gals. Thousands.</i>	<i>Gals.</i>
1885	13,768	0.38	815,864	21.34	.....	....	18,243	0.32
1888	13,417	0.36	881,056	22.94	.....	....	30,267	0.51
1890	14,924	0.40	793,870	20.67	76,340,000	1.54	24,121	0.38
1895	14,553	0.37	940,368	24.43	55,196,900	1.06	16,363	0.23
1896	15,776	0.40	1,187,224	29.50	.....	....	16,578	0.23

From the above it appears that the consumption of wine per head of the population in the United Kingdom, Germany, and the United States is insignificant; whilst as regards the total quantity consumed it is to be noted that in these three countries taken together with their 150 millions of inhabitants it is approximately a tenth part of what is consumed in France with its 38 millions of inhabitants.

BEER.

Years.	United Kingdom.		France.		Germany.		United States.	
	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.
	<i>Gals. Thousands.</i>	<i>Gals.</i>	<i>Gals. Thousands.</i>	<i>Gals.</i>	<i>Gals. Thousands.</i>	<i>Gals.</i>	<i>Gals. Thousands.</i>	<i>Gals.</i>
1885	975,645	27.1	182,982	4.6	908,292	19.8	476,578	8.8
1888	1,008,475	27.2	178,222	4.4	1,015,916	21.5	639,400	10.7
1890	1,124,535	30.0	189,838	4.8	1,142,042	23.3	712,375	11.4
1895	1,160,127	29.6	196,548	5.1	1,215,676	23.5	899,063	12.4
1898	1,211,639	30.7	199,123*	5.2	1,333,090	25.5	900,161	12.7

* Proof gallons containing 50 per cent of alcohol.

The two great beer-producing countries are Germany and the United Kingdom, the production in Germany being slightly the larger in bulk, but in the matter of consumption per head the positions are reversed. The production in the United States is increasing, but the consumption per head averages, roughly speaking, only half that of Germany, whilst in France it is not a fifth of that of the two great beer-drinking countries. It may, however, be remarked that as regards consumption, Belgium, where more than 43 gallons of beer are consumed per head of the population, stands higher even than England or Germany, and higher indeed than any individual state of the latter country except Bavaria, where the consumption is highest of all, amounting to no less than 50 gallons per capita.

SPIRITS.

Years.	United Kingdom.		France.		Germany.		United States.	
	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.	Consumption.	Per Head of the Population.
	<i>Gals.* Thousands.</i>	<i>Gals.*</i>	<i>Gals.* Thousands.</i>	<i>Gals.*</i>	<i>Gals.* Thousands.</i>	<i>Gals.*</i>	<i>Gals.* Thousands.</i>	<i>Gals.*</i>
1885	24,515	0.96	62,536	1.69	....	....	58,810	1.05
1888	24,138	0.92	64,592	1.69	74,580	1.58	63,179	1.05
1890	28,374	1.02	73,172	1.91	101,024	2.07	73,161	1.17
1895	29,043	1.00	68,156	1.78	97,746	1.89	64,831	0.98
1898	40,076	1.01	70,180	1.85	100,760	1.94	59,186	0.83

* Proof gallons containing 50 per cent of alcohol.

From the above it appears that the consumption of spirits in the United Kingdom and the United States does not differ very materially, averaging in each instance about one gallon per head. In France, and in Germany, also, the case is, however, altogether different, for here the consumption over a series of years averages more nearly two gallons per head than one. . . .

As regards the question of the taxation of alcoholic beverages it is stated in the memorandum that the United Kingdom, France, Germany, and the United States all derive large revenues from the taxation of such beverages, the actual proportion so derived to the total revenue being in the case of the United Kingdom 85 per cent; in France, 19 per cent; in the United States, 30 per cent; and in Germany, 17½ per cent; and it is in these countries that the amount of drink consumed is the largest.— *Board of Trade Journal*, London, volume xxiv, number 138.

COMPARATIVE CRIMINAL STATISTICS.

The following summarized report is reprinted from *Notes on the Subjects Discussed at the St. Petersburg Meeting of the International Statistical Institute*, presented by Major P. E. Craigie at a meeting of the Royal Statistical Society :—

M. Tarnovsky read a paper, which presented features of special interest, on the proportion of *Acquittals to Offences and Crimes in Russia from 1889–93*. He thought that sufficient attention had not hitherto been given to the numerically recorded results of the different systems of jurisdiction in vogue in the great European countries. There were difficulties owing to the varied forms of criminal procedure, but points for comparison might be found in such questions as the relative proportion of acquittals by different tribunals.

In general there were more acquittals in trials by jury than without. He gave a table illustrating this by the proportion of acquittals for every 100 persons tried in a court of first instance in the following countries :—

	With Jury.	Without Jury.
Russia (1889-93).....	34	26
France (1889-93).....	29	7
Austria (1883-93), excluding Hungary.....	26	14
Germany (1889-93).....	25	13

These figures were, however, not entirely homogeneous, as in Russia notably the *tribunaux d'arrondissement* try in the first instance more than half their cases with the assistance of a jury, whilst in the other three countries the number of cases tried by a jury does not exceed 5 or 6 per cent of the total cases tried by a court of first instance, and in France the proportion is even less than 3 per cent. But if only those cases are taken for Russia, which are tried both in France and Russia equally with the assistance of a jury, the proportion of acquittals for Russia would be 32 per cent, as against 29 per cent for France.

The figures quoted show that both jury and magistrates are more indulgent in Russia than in Western Europe, but it is especially remarkable that the difference is much greater for the courts which try cases without the assistance of a jury than for those which have a jury. Moreover, in Germany and Austria the jury acquits twice, in France as much as four times, as often as the State tribunals (*tribunaux d'Etat*). In Russia the jury only acquits to an extent of one-third more than the magistrates.

The high proportion of acquittals in Russia is due to a variety of reasons, which render criminal procedure slow and insecure; chief of these is the immense area of the different judicial districts, which on an average occupy in Russia 40,000 square kilomètres, while in Germany and Austria they consist of 3000 to 4000 square kilomètres, and in France of only 1000 square kilomètres. In the same way a court of first instance in Russia has to deal with 1,200,000 inhabitants, in Austria with 370,000, in Germany with 300,000, and in France with only 110,000.

The greater indulgence of a jury becomes especially noticeable when regard is had to the sex of the accused. In Russia juries, on the average, for the period 1889-93, acquitted 34 per cent of the

men and 51 per cent of the women. The corresponding acquittal figures for France during the same period were 25 per cent men and 49 per cent women. Magistrates, on the contrary, hardly make any difference between the sexes. In Russia they acquitted 26 per cent men and 25 per cent women in the *tribunaux d'arrondissement*, and in France 6.6 per cent of the men, and 9 per cent of the women.

Making a comparison of the crimes which are almost identical in the two countries, France and Russia, the following table shows the proportion of acquittals by a jury : —

Russia.		France.	
Offences.	Acquittals per Cent.	Offences.	Acquittals per Cent.
Forgery (<i>Faux Divers</i>).....	57	Wounding and assaulting.....	45
Destruction of property } (incendiarism).....	50	Forgery (<i>Faux Divers</i>).....	30
Swindling and breach of } trust.....	50	Breach of trust.....	30
Offences against morality.....	48	Destruction of property.....	37
Wounding and assaulting.....	45	Uttering false coin.....	34
Uttering false coin.....	39	Offences against morality.....	26
Robbery with violence.....	38	Homicide.....	31
Homicide.....	34	Robbery without violence.....	19
Robbery without violence.....	27	“ with “.....	14
Sacrilegious robbery.....	26	Sacrilegious robbery.....	9

The causes producing the proportion of acquittals in the various offences are thus almost the same in the two countries ; habitual criminals have much less chance of being acquitted either by a jury or a magistrate than first offenders. Recidivism is most frequent among the various forms of theft and robbery, while, further, these offences are generally not very complicated, proofs being readily obtainable. But forgery and breach of trust are very different ; here the offenders are generally educated persons, who can make a good defence, and thus are the more likely to obtain an acquittal. The same analogy can be showed, though to a smaller extent, in the acquittals of courts without a jury, as, taking the same quinquennial period 1889-93, the following table shows : —

Russia. Tribunaux d'arrondissement without a Jury.		France. Tribunaux correctionnels.	
Offences.	Acquittals per Cent.	Offences.	Acquittals per Cent.
Libel	54.5	Libel.....	30.8
Wounding and assaulting.....	49.5	Perjury.....	23.4
Destruction of property.....	38.1	Manslaughter.....	16.2
Swindling, breach of trust.....	37.6	Swindling, breach of trust.....	10.4
Perjury.....	37.0	Offences against morality.....	7.0
Homicide.....	25.0	Wounding and assaulting.....	6.3
Rebellion and assaults on officials..	16.0	Destruction of property...	6.2
Theft.....	12.7	Theft.....	5.7
Vagrancy and Begging.....	6.0	Vagrancy and Begging....	2.4
		Rebellion and assaults on officials.....	2.3

The greatest proportion of acquittals by a jury are reported from Southern Russia. But, as regards acquittals in decisions by magistrates without a jury, the most indulgent districts are those in the west, although the juries in these same districts are severe; so much so that in 11 courts (*tribunaux*) in the west and northwest of Russia in Europe the magistrates acquit more often than the jury.

STATISTICS OF TRADE UNIONS.

The *Ninth Report of the Chief Labor Correspondent of the Board of Trade* on Trade Unions deals with the statistics for 1896.

Year.	Total Number of Trade Unions.	Membership of All Trade Unions. Thousands.	Membership of 100 Principal Trade Unions. Thousands.
1892	1,184	1,461	913
1893	1,239	1,453	917
1894	1,285	1,494	931
1895	1,316	1,597	931
1896	1,330	1,487	966

From the returns received it appears that there are 127 trade unions that have female members, the aggregate number of such members amounting to 108,578.

The following table shows the amount of expenditure for different purposes of these unions :—

AMOUNT OF EXPENDITURE BY 100 PRINCIPAL UNIONS.

Class of Expenditure.	Amount of Expenditure in Thousand Pounds.				
	1892.	1893.	1894.	1895.	1896.
Unemployed, etc. benefits	349	459	463	436	285
Dispute benefit.....	357	504	158	190	155
Sick and accident benefits.....	206	240	239	263	246
Superannuation benefit.....	103	112	123	131	141
Funeral benefit.....	69	75	69	76	75
Other benefits and grants.....	83	123	122	49	64
Working, etc. expenses	251	252	280	256	270
Total.....	1,420	1,858	1,446	1,406	1,239

NOTES.

An illustration of the difficulty of using statistics of institutions where delinquents are kept is furnished by the *Report of the State Work-house and House of Correction*, in *The Twenty-ninth Annual Report of the Board of State Charities and Corrections of Rhode Island, 1897*. In 1897, 852 persons were committed to the institution as compared with 829 in the previous year, thus showing an increase of 23. At the close of 1897, however, there was a smaller number in the institution than at the close of 1896. These apparent inconsistencies are reconciled by the fact that more inmates were discharged during the year than previously.

It is noted that the offences for which persons had been committed during the past two years as given from the mittimusess have changed, but this improvement is due in a measure to a variation in the names of offences ; for example, the number of persons convicted as being drunkards is less than in the two immediately preceding years. At the same time the number of the vagrant class is largely increased. About 40 per cent of the persons committed in 1897 were of foreign birth, 75 per cent were wholly and about 5 per cent were partly of foreign parentage.

In *Bulletin No. 10 of the United States Department of Agriculture* (Section, Foreign Markets) entitled our *Foreign Trade in Agricultural products during the Five Fiscal Years 1893-97*, attention is called to the fact (p. 18) that in the preparation of statistical tables employed in this bulletin the classification of agricultural imports and exports used in similar statements previously issued by the Department has been subjected to a careful revision. The list of products included has been increased by the addition of several commodities. Most of these commodities are of small value, the only change of any considerable importance is the inclusion for the first time of malt and spiritous liquors. This seems to be justified on the ground that the commodities mentioned, although secondary products, are as purely agricultural in their original source as several other articles which it has been the custom to include, such as sugar, glucose, starch, flour, butter, cheese, margarine, lard, tallow, animal and vegetable oils, cider, vinegar, wines, etc. These secondary products form a very important part of the agricultural category, and any statement from which they are excluded would fail to convey an adequate idea of the extent to which agriculture enters into our foreign trade.

In the *Seventh Annual Report of the Charity Organization Society of Hartford, Conn., 1897*, a table is presented showing the causes of need of applicants for relief. The principal causes may be thus summarized:—

	Resident.	Non-Resident.
Intemperance	309	128
Intemperance combined with other causes	44	5
Sickness	132	3
Sickness combined with other causes	13	0
Extravagance	30	9
Lack of employment	39	8
Inefficiency	65	7
Disagreeable dispositions	24	0
Aversion to work	20	6
Accidents	14	3
Physical defects	12	5
Old age	12	3
No male support and large family	32	0
Neglect by relatives	17	0
Dishonesty	23	34
Licentiousness	17	9
Not in need	225	20
Other causes		
Total	1076	204

The *Thirteenth Annual Report of the Bureau of Labor Statistics for the State of Connecticut for the year ending November 30, 1897*, contains (pages 189-198) tables showing the rates of wages, the hours employed, and the method of payment of employees in various industrial departments of municipalities in Connecticut.

Number 5 of the *Michigan Monthly Bulletin of Vital Statistics* (January, 1898) contains a table showing the comparative mortality of Michigan, Connecticut, New York, and Ontario during the last four months of 1897. This consolidated report is based upon data collected by those states and furnished to the Michigan bureau. Connecticut, Michigan, and New York had an aggregate population at the last United States census of 8,888,000, about 14.11 per cent of the population of the United States. The population of Ontario in 1891 was 2,114,321. These tables are therefore based upon returns from nearly a seventh of the population of the United States and Ontario. The table shows the mortality rates for various diseases, and shows the per cent of deaths under five years to total deaths.

The birth rate in New Zealand in 1896 was 26.33 per thousand, showing a steady decrease since 1891. At the same time the number of marriages to the population has been increasing. In 1881 there were in New Zealand 5.72 births to every marriage in the previous year, and in 1896 the proportion had fallen to 4.32 to each marriage. In 1880 New Zealand had the highest birth-rate of all the Australian colonies, 40.78, but now the proportion is just reversed, excepting in case of Western Australia.

In the *Second Report of the Registrar of Births and Deaths of the Cape of Good Hope*, 1896, statistics are given for illegitimacy. The births of children belonging to the mixed, other and Hottentot races with Malays amounted in 1896 in the colony proper only to 12,840 in all, 6552 being boys and 6288 girls. Of these 3988 were illegitimate, consisting of 2004 males and 1984 females, giving the following percentage proportions, viz.: —

Illegitimate births to total mixed and other births (colony proper only) .	30.67
Male illegitimate births to total male births	30.59
Female illegitimate births to total female births	30.76

In Trinidad the percentage of illegitimacy for Coolie births was 80.30 (*Registrar-General's Report for 1891*).

SAUERBECK'S PRICE INDEX.

Mr. Sauerbeck makes the following statement to the *Journal of the Institute of Bankers* in regard to the course of prices to the end of 1897:—

The annual index numbers of the prices of 45 commodities, the average of the 11 years 1867–77 being 100, are:—

Average.		Average.	
1878-87	= 79	1891	= 72
1888-97	= 67	1892	= 68
—	—	1893	= 68
1890	= 86	1894	= 63
1895	= 70	1895	= 62
1896	= 72	1896	= 61
1899	= 72	1897	= 62

The index number for last year is one point better than that for the preceding year, or the same as in 1895. As the low figure of 1896 was mainly caused by unprecedentedly low prices, in the aggregate, of articles of food, so the number of 1897 was principally affected by the opposite course, higher prices of food, while the average of all materials was the lowest on record. Amongst the articles of the first class, wheat, barley, oats, potatoes, rice, and all sorts of meats, and particularly pork, were higher; but sugar, coffee, and tea declined and ruled, on the average, lower than ever before. In the case of materials there was a moderate improvement for copper, tin, lead, and coals, but all textiles—cotton and wool, flax, hemp, and jute—and a number of sundry materials—*viz.*, tallow, linseed oil, petroleum, nitrate, and indigo—ruled lower. Timber and soda, on the other hand, were higher.

Taking articles of food and materials separately the index numbers compare thus:—

	Feb.	Dec., 1895	July	Dec., 1896	May	Sept.	Dec., 1897
Food	63.8	60.4	60.0	63.9	63.7	67.5	66.5
Materials ..	57.0	61.8	58.6	60.6	59.4	60.4	59.4

The course of prices during last year was strongly influenced by the rise of wheat in the second half and by the fall of cotton in the last quarter. While articles of food stand still 4 per cent higher than in December, 1896, and 11 per cent above the lowest point in July, 1896, materials are 2 per cent lower than a year ago, but still 4 per cent higher than at the lowest period in February, 1895.

Ten descriptions out of 45 contained in my tables showed records of lowest prices — *viz.*, sugar (two descriptions), flax, Manila hemp, jute, tallow, linseed oil, and nitrate the lowest of the century, and Brazil coffee and indigo the lowest since 1852.

Owing to the introduction of the gold standard in Japan the export to that country was entirely stopped, but there was a good demand for India, and, as in the previous year, silver was strongly favored by the Russian currency requirements. It appears that fully one-third of the world's total production was taken for that purpose. A year ago, and again in September, I called attention to this great demand, and it may be useful to inquire how much silver will really be required by Russia. It is the intention to replace all one and three rouble notes by silver, and as of these 233,000,000 roubles were issued, it would at 18 grammes fine silver require 4,200,000 kilos, or 146,000,000 oz. standard. It is difficult to know the exact amount actually taken, as the complete Russian statistics are not to hand, but I estimate that the net quantity during the last three years, after allowing for industrial consumption, reached about 2,700,000 kilos. fine, equal to 94,000,000 oz. standard, or 150,000,000 roubles. As it is reported that only 106,000,000 roubles have so far been coined, there must be a considerable stock of silver on hand, while the quantity still to be purchased would on this basis amount to about 52,000,000 oz. standard, equal to about 30 per cent of one year's production of the world. It is assumed in this calculation that the quantity of old silver coin in Russia will be sufficient for small coins.

With regard to the general state of trade in Europe during the past year opinions appear to differ, but I believe there is plenty of evidence that the result was, on the whole, less favorable than that of 1896 and the second half of 1895. The famine in India and the outbreak of plague seriously impeded the trade with this great dependency, and there was also a considerable reduction in the exports to the Far East, to Australia, and South America. The change in the tariff of the United States, while stimulating exports there during the first half of the year, caused a complete stoppage of demand later on. The textile industry, particularly of cotton and wool, was very depressed, and though the good demand for iron and other metals continued throughout the year the engineering trade in this country was greatly hampered by the protracted strike. The harvest on the Continent

was bad, causing a rise in the prices of breadstuffs, while large sugar crops and unprecedented crops of American cotton and Brazil coffee had a depressing influence on these articles.

In the United States, on the other hand, things were much better. Prices of wheat were already good last winter, and in view of a protective tariff there was considerable speculation in raw materials and manufactures, to be followed in the latter part of the year by the fortunate coincidence of a good harvest and high prices of wheat. The exports show again, as in the previous year, an enormous excess over the imports, about \$350,000,000, and this must soon increase the demand for foreign goods again, notwithstanding the high duties. The settlement of the currency makes, unfortunately, no progress, although with a little good will and only a moderate amount of gold it could be placed in a sound position.

The future of prices of raw materials will depend on the American demand and on any improvement in the condition of the East and of other extra-European countries, which, in my opinion, cannot be very far distant, but the general index number may be affected by any weakening in the now exceptional prices of wheat, and this must occur as soon as larger quantities are again brought to market.

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CONCENTRATION IN PIG-IRON AND COAL PRODUCTION.

BY E. W. PARKER.

A few weeks since, in response to a request of a correspondent, I compiled a statement showing to what an extent the manufacture of pig-iron is following the tendency of many other industrial enterprises,—that is, concentration in the hands of comparatively few large concerns, and thus resulting in the freezing out or absorption of the individual producers and smaller corporations. The results of my investigations show some very interesting facts. My information was gathered from the files of the *American Manufacturer* at Pittsburg, in which city I happened to be at the time. The *American Manufacturer* publishes once a month a statement of the condition of the blast furnaces in the United States during the preceding month, the statements being compiled from direct returns of the producers. These show the number of furnaces in blast—charcoal, anthracite and bituminous, and coke—with the total weekly capacity of each. My investigations extended back only as far as 1890, and the results are shown in the accompanying tables. In January, 1890, the total number of furnaces in blast was 845, with a total weekly capacity of 175,002 tons of pig-iron, or an average weekly capacity per furnace of 507 tons. In January,

1898, the total number of furnaces in blast was 190, with a total weekly capacity of 227,979 tons of pig-iron, an average weekly capacity per furnace of 1252.5 tons. Observe that the number of furnaces in blast has decreased from 345 to 190, a difference of 155, the number of furnaces in blast in January, 1898, being only 55 per cent of the number in blast in January, 1890. The total weekly capacity, however, has increased from 175,000 tons to 228,000 tons, a gain of 30 per cent, while the average individual capacity increasing from 507 tons to 1252.5 tons shows that the average output per furnace in January, 1898, was two and one-half times what it was in 1890. The development of these conditions since 1890 has been remarkably regular and persistent. In January, 1890, the average capacity per furnace was, as stated, 507 tons. In the opening months of the succeeding years it was as follows: 1891, 537 tons; 1892, 618 tons; 1893, 703 tons; 1894, 780 tons; 1895, 933 tons; 1896, 981 tons; 1897, 1022 tons. In July, 1897, it was 1165 tons; in November, 1897, 1187 tons, and reaches its highest figure in January, 1898, with 1252.5 tons. The decrease in the number of furnaces in blast has not been so regular, but at no time since 1890 has the number been so large as it was in that year. In January, 1894, the number of furnaces in blast was only 132, while in July of the same year the number had fallen to 111, the average capacity per furnace being 780 tons at both periods. This was a year of great depression in the iron industry, following the panic of 1893, and the production of pig-iron amounted to only 6,657,888 tons, the smallest output in the period under review, being but little more than two-thirds of the production in either 1890 or 1897. In January, 1896, the number of furnaces in blast was 240, the capacity being 981 tons per furnace. The first half of this year (1896) was one of great activity, the production in the first six months being larger than in any other similar period with the exception of the latter halves of 1895 and 1897. In July of 1896 the number of furnaces in blast had decreased

to 191, again to 160 in January, 1897, to 148 in July, increasing with the industrial revival of the latter part of 1897 to 185 in November, and 190 in January, 1898.

Considering the same proposition according to the kinds of fuels used, we find that the number of charcoal furnaces has decreased from 66 in January, 1890, to 15 in January, 1898, less than one-fourth. (In December, 1897, there were 21 charcoal furnaces in blast.) The total weekly capacity has declined from 12,693 tons in 1890 to 4725, showing the production of charcoal iron in January, 1898, to be little more than one-third of what it was in 1890; but when we consider the average capacity per furnace we find the same rule obtains as for the total. In January, 1890, the average capacity per furnace was 192 tons per week, while in January, 1898, it was 315 tons, an increase in individual capacity of 64 per cent. Among the anthracite furnaces there has also been a decrease in production, the total capacity in January, 1890, being 41,954 tons, while last January it was 20,669 tons, less than one-half. The number of furnaces in blast has decreased from 111 in January, 1890, to 29 in 1898, a difference of 82, or 74 per cent. But here again in spite of these decreases we find a large increase in the average capacity per furnace. In 1890 the average weekly capacity per furnace was 378; in 1898 it is 713, an increase of 88 per cent.

The proportion of decrease in the number of furnaces using bituminous coal and coke has been less than in the others. Against 168 furnaces in blast in January, 1890, we have 146 in blast in January, 1898. But in this line we see no decrease in the total weekly capacity. On the other hand, the total weekly capacity has increased from 120,845 tons to 202,585 tons, a gain of about 66½ per cent, while the average capacity per furnace has increased from 716 tons to 1888, nearly double.

It is interesting to note in connection with this that there are only two important iron-producing districts in which

there has been an increase in the number of furnaces in blast in the eight years under review. In the Illinois, Missouri, and Wisconsin district there were 16 furnaces in blast in 1890, and 19 in 1898, a gain of three. There have been as many as 21 in January, 1896, while in January, 1894, there was but one. In the Pittsburg or Allegheny county (Penn.) district, the most important one in the country, there was a gain of eight, from 21 in 1890 to 29 in 1898. In December, 1897, there were 30 furnaces in blast. The lowest number was 16 in July, 1894. In the Shenango Valley, Pa., there were 16 in 1890, and 11 in 1898, a loss of 5. In the—

	1890.	1898.	Loss.
Juniata and Conemaugh Valleys, Pa.	13	7	6
Virginia and Maryland	12	10	2
Mahoning Valley, Ohio	13	10	3
Eastern, Central, and Northern Ohio	14	14	0
Tennessee and Kentucky	13	10	3
Georgia and Alabama	23	18	5

In regard to the average weekly capacity of the furnaces in these districts we find that there have been the following changes:—

	1890.	1898.	Per cent of Increase.
Allegheny County	1,130	1,962	75
Shenango Valley	701	1,523	117
Juniata and Conemaugh Valleys	466	1,326	184
Virginia and Maryland	609	824	35
Mahoning Valley	841	1,515	80
Eastern, Central, and Northern Ohio	803	1,391	73
Tennessee and Kentucky	423	663	57
Georgia and Alabama	600	1,112	85
Illinois, Wisconsin, and Missouri	991	1,691	71

In not one of the districts does the total productive capacity show a decrease. In the Allegheny county district the total capacity increased from 23,731 tons to 57,461; Shenango Valley from 11,223 to 16,738 tons; Juniata and Conemaugh Valleys from 6055 to 7949; Virginia and Maryland from 7309 to 8242; Mahoning Valley from 10,938 to 15,150; Eastern, Central, and Northern Ohio from 11,250 to 22,250; Tennessee and Kentucky from 5497 to 6634; Georgia and Alabama from 13,814 to 20,009; Illinois, Wisconsin, and Missouri from 15,854 to 32,134.

As to whether this increased productive capacity has been the result of or the cause of the lower prices of iron and steel, and the manufactures thereof, I shall not attempt to say. That they have attended each other is true. In 1890 the average price of No. 1X foundry pig-iron in Philadelphia was \$18.40 per ton. Ten years before it was \$28.50. In 1870 it was not far from \$50. (In 1872 it was \$48.88.) In February, 1898, the price of this grade of pig-iron in Philadelphia is quoted at \$12 to \$12.25.

According to Mr. James Gayley of the Carnegie Steel Co. this increased individual furnace capacity has been the result of several causes. First may be mentioned an increased diameter of hearth; second, a greater depth of hearth, so that more carbon could be burned below the tuyeres; third, improved blowing machinery and an increased number of tuyeres, all of which may be summed up as providing means for a more rapid combustion of the carbon in the hearth of the furnace, as on this depends the product of the furnace.

Mr. John Fulton, of Johnstown, adds a fourth cause — an increase in the heat of the blast. Mr. Gayley states that there have been some changes made in the hot-blast stoves, but he is not convinced in his own mind that the changes are improvements. These improvements of hearth, blast, and tuyeres have done more than increase the capacity of the furnace. A no inconsiderable item in the economies resulting from improved furnace practise is the reduction in the amount of fuel consumed. In 1890 one ton of pig-iron with 2000 pounds of coke (equivalent to one and one-half tons of coal) was considered good work. A good furnace today will use only 1800 pounds of coke, per ton of pig, showing that a saving of 10 per cent has been effected in the fuel.

There are two other factors which have had an important bearing on the increased capacity of the blast furnaces and the lowering of the cost of production; one is the protecting of the bosh walls of the furnace with bronze bosh cooling

plates, thus protecting the walls at this point, resulting in prolonging the youth of the furnace, and maintaining the output far beyond a period when formerly furnaces were blown out for repairs. Mr. Gayley claims that the use of these bosh plates reduces the fuel consumption. Finally, we must take into consideration the improved mechanical appliances for handling the furnace charge. These have been made necessary by the larger capacity and output, and have followed the other changes.

Having this history of the iron industry before me, I have compiled from the records of the Geological Survey a statement in regard to the production of coal. My object was to see how far, if at all, coal mining had shown a similar tendency. My investigation covered the six years from 1891 to 1896, inclusive. I took for consideration the output of bituminous coal mines, producing (1) less than 10,000 tons per annum, (2) from 10,000 to 50,000 tons, and (3) over 50,000 tons. The figures show that the proportion produced by the smaller mines remained practically constant at 4 per cent of the total, the middle class varied from 16 to 21 per cent, being 17 per cent in 1891 and 16 per cent in 1896, while the larger class varied from 74 to 80 per cent, being 79 per cent in 1891 and 80 per cent in 1896.

If the coal mining interests have not as yet shown the same degree of consolidation, indications unmistakably point to this result. The prices of both anthracite and bituminous coals have been showing a declining tendency for several years. In 1887 the general average price of bituminous coal was \$1.12 per ton of 2000 pounds. In 1888 and 1889 it was \$1.00. During the next three years it was 99 cents, falling to 96 cents in 1893, to 91 cents in 1894, to 86 cents in 1895, and reaching the lowest notch, 83 cents in 1896. This is a decline of 27 per cent in 9 years. The statistics for 1897 are not sufficiently advanced to be able to state what the average price was for the year. It is possible that the two months' strike may have resulted in an advance in value

for the time that will show an improvement in the price, but this should not be taken as an indication of better conditons. Since 1887 and to the close of 1896 there was not a single reaction against the declining tendency in the bituminous coal trade. Anthracite prices declined from \$2.01 per short ton in 1887 to \$1.43 in 1890. Restricted production in the anthracite region in 1892 and 1893 brought the prices up to \$1.57 and \$1.59, respectively, while an output in excess of demand in 1885 reduced the price to \$1.41 per short ton, this figure being obtained by dividing the total value by the total product including colliery consumption. Anthracite is, however, always sold at the mines by the long ton of 2240 pounds. Excluding the item of colliery consumption, the average price for all coal marketed in 1895 was \$1.72 per long ton. This figure represented a net loss of 8.1 cents on every ton of coal mined by the Philadelphia & Reading Coal & Iron Co., approximately \$1,000,000, while the Lehigh Valley Coal Co. lost 18.48 cents on every ton of coal mined and purchased. The anthracite operators got together in 1896, restricted production and put the price up to \$1.85 per long ton at the mines. The shipments from the anthracite region in 1896 amounted to 43,177,485 long tons. The estimated domestic consumption was 42,844,222 tons, the exports, 1,350,000 tons, making a total of about 43,695,000 tons, the deficiency being made up by stocks carried forward from 1895. The estimate made by the Anthracite Coal Operators' Association, of domestic consumption in 1897, puts the figures at 38,159,000, — the exports approximately were 1,800,000 tons, making a total, say, of 39,460,000 tons. The shipments from the region during the year were about 41,200,000 tons, making a surplus of production over consumption and exports of over 1,700,000 tons*. It is the surplus that demoralizes prices, and we

* Since the above was written the returns to the Geological Survey show that the shipments of anthracite coal in 1897 amounted to a little over 41,600,000, so that the surplus would be 2,100,000 tons. There was not, however, any decline in the selling price of anthracite as compared with 1896. The price per long ton, considering all marketable sizes, was \$1.85 in both years.

shall doubtless see, when the returns for 1897 are all in, that lower prices for coal, causing in turn a reduction of wages among the miners, were responsible for the deplorable affair at Hazelton last summer. Bituminous coal operators are between two fires,— a strong mine workers' union on the one hand, demanding and receiving higher remuneration, and surplus production and falling prices on the other. In the light of present knowledge it is hard to see how any relief is to be obtained unless advantage is taken of the economies in operation, which can only be effected by increased production at larger plants and the closing down of smaller mines.

THE ANNUAL STATISTICS OF MANUFACTURES
IN MASSACHUSETTS.

BY HORACE G. WADLIN.

A paper has recently been published by my friend, Mr. North, developing a line of argument offered by him before the Committee on the Census of the United States Senate, in which he forcibly takes issue with a proposed plan for obtaining, biennially, statistics of manufactures in the United States, which had been presented to the committee by Hon. Carroll D. Wright. With Mr. North's main contention I have nothing to do. The plan which he was opposing has, I believe, been modified. But in the course of his argument he makes certain criticisms upon the annual statistics of manufactures, as taken in Massachusetts, which seem to me unwarranted.

Let me say, at the outset, that I do not think the proposed enlargement of the official statistics at Washington which he was opposing is necessarily justified by the success of a similar plan within the compact State of Massachusetts; nor, on the other hand, do I think it essential to his argument to allege the failure of the plan in Massachusetts. I am particularly interested in the progress of statistical work in this State, however, and of this work I believe, and hope to show, that the annual statistics of manufactures are an important part. The subject is germane to the purposes of this Association, and therefore, in no spirit of controversy, I have the honor to present this paper.

A standard is set up by which the annual statistics may be tried. This standard is the census, and it is assumed that only a census, that is, a complete return from all establishments of every kind, can show industrial conditions in general; and as the annual statistics do not include all the establishments which have heretofore been included in the

census, it therefore follows that they cannot measure such conditions. The standard proposed may be accepted, but not the assumption. On the contrary, I propose to compare the annual statistics with the census, and by this comparison to show their accuracy.

The measurement of growth or decline in our industries is one of the principal uses of the census. Now, if the census affords a correct measure, and we find that the annual statistics agree substantially with it, then the contention that the annual statistics are of equal value as a measure is sustained. Exact agreement, of course, is not expected. No two censuses taken at the same time over the same territory would absolutely agree. But I ought to show, and will show, that there is no material disagreement between the results obtained in the annual statistics and in the census of manufactures taken either by the Commonwealth or by the United States.

The Massachusetts census of 1895 shows an increase since 1885 in the aggregate value of goods made, amounting to 25.97 per cent. Computing the growth for 10 years on the basis of the annual percentages of growth or decline shown from year to year in the annual statistics of manufactures, we arrive at a percentage of 28.35. This is a variation of 2.38 per cent in a period of 10 years, or not more than twenty-four one-hundredths of one per cent per year, upon the average.

Again, taking the establishments which made returns for annual statistics in 1895 and selecting the returns of the corresponding establishments for 1885, and determining the percentage of increase from them alone, we have a percentage of 26.42* as against 25.97 shown in the census, a variation of forty-five one-hundredths of one per cent only.

Still again, taking the total value of goods made, as shown in 1895 as against the amount shown in 1890 by the United States Census, we find a percentage of decline amounting to 4.32. The percentage of decline shown by the annual sta-

* *Statistics of Manufactures, 1895, Introduction, p. xxi.*

tistics of manufactures, based upon identical establishments for which returns are comparable, is 4.60; a variation of twenty-eight one-hundredths of one per cent.

The increase in wages paid in 1895 as compared with 1885, by the data drawn from the annual statistics, was 34.95 per cent, and, as finally determined by the census, 30.90 per cent; showing a variation of but 4.05 per cent in an aggregate of nearly \$200,000,000. The increase in stock used, by data from the annual statistics, was 22.80 per cent, and by the census, 18.34 per cent; a variation of 4.46 per cent in an aggregate of about \$460,000,000.

In other words, if we had taken no census but had relied upon the annual statistics, the sum of wages paid in 1895 would have been placed at \$198,936,969; and the census returns aggregate \$192,970,059. As to stock used, the aggregate estimated from the annual statistics is \$478,622,158; and by the census it was found to be \$461,254,358. As to output, the estimate from the annual statistics is \$852,872,643; and the actual census aggregate \$849,807,302. Do not these comparisons establish the validity of the annual statistics as a basis for judging of the increase in the different elements?

By means of the percentages of gain shown in the annual statistics for 1890 and 1885, and using the State census figures of 1885 as a base, we estimated, nearly one year in advance of the publication of the actual census returns, the output for 1890 in Massachusetts at \$880,614,364. The figures of the Eleventh United States Census, when published, showed \$888,160,403; a variation of less than nine-tenths of one per cent.

In order to compare the results indicated by the annual statistics with the returns of the Eleventh United States Census for the leading industries in Massachusetts certain differences in classification must first be eliminated. In the classification employed in the annual statistics, following the plan adopted in the State census, the cotton industry is

shown in two divisions, namely, "cotton goods," and "print works, dye works, and bleacheries," which should be combined in order to parallel the United States Census classification; and, on the other hand, with the value of "cotton goods" as returned in the United States Census should be combined the added value placed upon cotton fabrics in print works, dye works, and bleacheries in order to bring the industry into harmony with the items combined in Massachusetts.

The items "cotton, woollen, and other textiles," "mixed textiles," "worsted goods," and "woollen goods" as presented separately in the Massachusetts reports should be combined in order to parallel the aggregate woollen goods product of the Eleventh Census; and the item "wool hats" should be excluded from the census figures, as these are not included with woollen goods in the classification adopted in Massachusetts. From the value of "silk goods" presented in the United States Census the item "dress trimmings" must be excluded for the same reason. Some slight differences of classification may possibly still remain, but after the readjustments mentioned have been made, the figures will be fairly comparable, and for the State census of 1885 are as follows:—

Wool products *	\$50,861,392
Cotton products †	77,305,940
Carpets ‡	5,902,608
Silk goods §	3,501,240
Aggregate, combined textiles	\$137,561,240

In order to test the validity of the annual statistics as a measure of growth as compared with the census we may estimate the product of 1890 by applying to each of these totals the percentages of increase derived from the annual report. The results of this computation are presented in the following table in comparison with the figures from the Eleventh U. S. Census, and the variation noted:—

* Excluding carpets separately presented) and wool hats.

† Including print works, dye works, and bleacheries.

‡ Textile carpets only.

§ Excluding dress trimmings.

COMBINED TEXTILES — 1890.

Classification.	Estimated Product from Annual Statistics.	Product from Eleventh U. S. Census.	Variation. Gain (+) or Loss (—) in An- nual Statistics.	Percentage of Gain (+) or Loss (—) in An- nual Statistics.
Wool products *.....	\$61,690,888	\$63,976,966	— \$2,277,078	— 3.56
Cotton products †.....	112,096,302	110,537,767	+ 2,158,535	+ 1.95
Carpetings ‡.....	7,496,100	7,375,000	+ 230,091	+ 3.03
Silk goods §.....	5,004,672	5,897,569	— 892,897	— 7.28
Total.....	\$186,896,962	\$187,187,311	— \$291,349	— 0.16

* Excluding carpets (separately presented) and wool hats.

† Including dyeing and finishing textiles, added values.

‡ Textile carpets only.

§ Excluding dress trimmings.

In the aggregate, the value of product of the textile industry in Massachusetts for 1890, as estimated from the data derived from the annual statistics, was \$186,896,962; the census returns show \$187,187,311, a variation of \$291,349, the estimate based on the annual statistics being sixteen one-hundredths of one per cent too small. The variations in the items shown separately in the table are greater than that shown in the aggregate, but, except with respect to silk goods, are in no case very great upon the percentage basis. In silk goods the variation is 7.28 per cent, partly due to differences in classification impossible to eliminate; but the product varies but \$892,897, being on the one hand \$5,897,569, and on the other \$5,004,672.

We may apply the same test to two other leading industries of the State, namely, boots and shoes and paper. The total product of the first in 1885 was \$114,729,588, and of the other \$21,223,626. Applying to each the percentages of increase shown in 1890, as compared with 1885 by the annual statistics, we obtain the following estimates of product for 1890: Boots and shoes,* \$185,954,497; paper,† \$26,819,419. The United States Census figures are, respectively, \$187,588,047

* Includes cut stock, findings, uppers, custom work and repairing, and factory product.

† Includes paper, envelopes, paper goods and stationery goods, not otherwise specified.

and \$26,453,085. The variation is 1.19 per cent in boots and shoes, and fifty-one one-hundredths of one per cent in paper.

If, then, the census is set up as an accurate measure of the growth of the industries, as indicated by output, and the measurement of growth afforded by the annual statistics shows no material variation from that of the census, is it not certain that the annual statistics may be accepted as equally accurate?

These comparisons sufficiently show that the reports are not misleading, but that, on the contrary, they afford an exact basis of judgment; and therefore that the percentages drawn from them may be accepted as measuring the different elements relating to production.

The reason for this substantial agreement between the annual statistics, which include only a limited number of establishments, and the census, which aims to include them all, is not far to seek. It has been several times fully shown, but may now be repeated.

In the census of 1885, for example, the total product returned was \$674,634,269. Of this product, goods to the value of \$681,822,681, or 93.65 per cent, were turned out in only 6757 establishments, and in each of the other establishments, which swelled the aggregate number to 23,431, the value of goods made amounted to less than \$10,000. Further, 88.96 per cent of the total product was made in 4406 establishments. In other words, the returns from 4406 establishments would represent 88.96 per cent of the total value of goods made as returned in the census; and if returns were secured from 6,757 establishments we should then cover 93.65 per cent of the industrial output of the State.

We should not only cover this large proportion of the output, but also include a correspondingly large proportion of the persons employed, wages paid, and stock used. And it is also certain that the inclusion of the other establishments would not materially change the relations of the

different elements to one another, as expressed in percentages, or materially alter any deductions respecting our industrial conditions which are likely to be drawn from the returns. It is true that the conditions obtaining in the excluded establishments alone could not thus be measured, but, if these excluded establishments were included, it would not, I repeat, change in any material degree the relations of the different elements to one another, or affect any important deduction which could be made as to the condition of our industries as a whole.

If the establishments are graded in three classes,—low, medium, and high, classing as low, establishments in which the value of annual product, as returned in 1885, was less than \$40,000; as medium, those returning an annual product of \$40,000 but under \$150,000; and as high, those returning an annual product value of \$150,000 or more, it will be found that the percentages of increase in each grade vary; but, if the different industries are examined in detail, it will be seen that a practical uniformity exists in the percentages of increase in the medium and high grades, while those in the low grade exhibit a considerable variation. That fact is brought out by the census, and it is an important fact. But, if the returns from the medium and high-grade establishments only are taken, the percentage of increase derived from them is not materially different from that obtained when all the establishments are included. For example, the increase in 1890, as compared with 1885 in all establishments, was 27.70 per cent, and the percentage derived from the medium and high-grade establishments only was 25.68.* That is, to repeat, returns from the establishments graded in these last two classes will measure very closely the condition of the industries as a whole. The inclusion of the comparatively large number of establishments of low grade does not materially change either the aggregate results or the results in the ten leading industries of the State; and for that reason

* *Statistics of Manufactures, 1890, Introduction, p. xxi.*

the returns obtained in the annual statistics are in substantial agreement with the results shown in the census.

It is not assumed that "the prosperity of the smaller establishments can be correctly inferred from the ascertained condition of the larger industries which are made to stand as typical." But it is clear that the condition of the industries as a whole, in Massachusetts, whatever may be the case as to the whole country, can be shown by returns from a number of establishments relatively small, but which include in the aggregate a product relatively large, as compared with the establishments and product usually included in the census.

The annual statistics are not confined to "the large, perfectly equipped and thoroughly organized establishments which run on from year to year, with little change in the output, piling up stock, or taking orders in advance of their capacity to manufacture." In fact, the large establishments fluctuate extremely from year to year, in their output, in their employes, and even in their capital, if by capital we mean the sum actually devoted to production. Some run more evenly than others, it is true; but the returns do not exclude the smaller establishments.

The distinction between the establishments included and excluded conforms approximately to that between strictly factory and shop industries. This line was roughly drawn in the State census of 1875 in the separation of the statistics of "manufactures" on the one hand, from those of "related occupations" on the other. In the State census of 1885 and subsequently, no such division was made, which largely accounts for the great increase in the number of establishments without a corresponding increase in product. The failure to observe this distinction complicates the collection of the data and the work of tabulation; enormously increasing the cost, and retarding the publication of the returns, without correspondingly extending the value of the census or materially adding to our stock of statistical information.

National censuses prior to 1880 excluded establishments having an output of less than \$500 in the census year; yet of the large number of establishments returned in the State census of 1885, nine per cent were establishments of this kind, and nearly one-third of the whole number were establishments in which the aggregate product did not exceed \$1500. Many of these establishments, like those included in the United States Census of 1890, were not in any usual sense of the word manufacturing establishments, although they were industrial establishments. They include large numbers of country carpenters, blacksmiths, wheelwrights, painters, plasterers, plumbers, milliners, and dressmakers, many of whom were working either by themselves or with but one or two employés. They include concerns operating under sidewalks, in cellars, lofts, and attics, without machinery, without capital, consuming little, if any, raw material, adding nothing important to product. They include bottlers, who simply take liquor in bulk, and, adding nothing, put it up in bottles with a new label. They include cobblers who do not make shoes but simply re-bottom them. They include, or at least did include, until omitted by Mr. Porter in the middle of the canvass of the Eleventh Census (a precedent followed by the Massachusetts census office in 1895), dentists, who do nothing but set artificial teeth in plates; — but it is not necessary to multiply instances. None of these, except by a special use of the term, would be called “manufacturing establishments,” but have been thus classed in the Massachusetts Census of 1885 and in the Eleventh Census of the United States.

The results of the State Census of 1895 might have been published some months ago but for the inclusion of establishments like these, which we did not think it advisable to omit, inasmuch as they were previously included. But in presenting the results we shall endeavor to classify them separately, to an extent at least, so as to enable discrimination to be made in future censuses without disturbing comparisons with the past. Whether we have in the aggregate 26,928 estab-

lishments in Massachusetts, as reported in the Eleventh Census, or 23,431, as reported in the State Census of 1885, or a much smaller number, depends altogether upon how many concerns of this kind are included. After we pass the \$10,000 limit of product we enter directly upon this field. All of these concerns have never yet been enumerated, and many of those included have no books of account, and therefore estimate the required items from more or less fragmentary data.

I find my opinion as to their exclusion from the census of manufactures supported by the late General Walker, when, in speaking of the defects of the census law, in the remarks on the tables of manufacturing industries in the Ninth Census, he states that fully one-fifth of the cost of the census had been expended for returns relating to such establishments, and even then the returns were extremely unsatisfactory. "The money thus thrown away," he says, "would have served . . . to make the statistics of the larger industries complete and correct in the highest attainable degree, creditable to the census as a national work, and invaluable to the statesman, the political economist, and the practical man of business. . . . In a word, *the returns of manufactures should be restricted to those industries which are carried on in considerable establishments, and are susceptible of a thorough, complete, and detailed enumeration.*"* Whether or not the census should be thus restricted, however, is not pertinent to our present inquiry. At all events, it is clear that, if it be thought advisable to include industrial establishments of the kind mentioned, if properly classified by themselves, they do not materially affect the results or change in any important degree the deductions that may be drawn from the census. So far as they affect results at all, they vitiate conclusions by introducing elements entirely dissimilar to those which exist in establishments of the other class.

The annual statistics include the establishments which employ the bulk of the operative classes. For example, the

* *Ninth Census of the U. S.*, vol. iii, pp. 384-385.

average number of persons employed in 1895, by the census, was 432,272; and the average number employed in 1895, by the establishments put into comparison for annual statistics for the years 1895 and 1896, was 307,590, or 71.16 per cent, nearly three-fourths of the average number in the State. A larger number was actually covered but not used in the comparisons because the establishments were not represented in each of the years. Nor do the annual statistics neglect the new establishments. On the contrary, they are carefully noted, and finally take their place in the yearly comparisons. As a matter of fact, I may state that the enumerators of the population as a part of their duty returned to the office a list of all establishments, of whatever kind, engaged in manufacturing, and only a comparatively small number of them had not been noted previously by the Department.

The validity of the annual statistics being established by the standard set up, namely, the Decennial Census (and other illustrations will be given later), it will, I think, be plain that they afford a basis for determining *present* conditions; that is, conditions in the different industries at the time the returns are made. They are not expected to measure conditions as they exist at the end of ten-year periods; that is the purpose of the census. But they do afford reliable data as to conditions from year to year; and, really, that is all that has ever been claimed for them. And I do not mean data relating merely to the increase or decrease of the industries, but as to all points for which we are otherwise obliged to rely upon the censuses taken at intervals of ten years. For, although, as I have said, the census is used as a measure of growth, it is also of value in the statistical determination of important social questions relating to employment, to wages, to the relative preponderance of the sexes in the industries, to the relation between wages and product, and to other subjects, some of which are purely social, some economic, and others economic-social, if I may use that term. The conditions affecting all these are continually changing

from year to year, making the annual statistics of special value because they reflect immediate conditions much more perfectly than the census.

It is perfectly true that individual manufacturers do not "predicate business operations upon statistics of this character;" but it is not a valid argument that such statistics are worthless to manufacturers because no individual can draw from them conclusions which bear directly upon his own operations, nor that a manufacturer, who may never have had occasion to use them personally, may think them worthless. Similar objections are sometimes urged against the collection of census statistics by those who, for the moment, are disinclined to take the trouble, usually much magnified in their minds, to fill the required schedule. But the annual statistics, equally with the census, have a direct practical value in connection with subjects that are constantly brought forward relating to the condition of our industries, involving inquiries which are frequently made by manufacturers upon matters relating to their interests, but which are by no means confined to manufacturers.

There is constant inquiry from the public, from legislators, from writers upon economic subjects, from students of economic questions, from persons employed in the different industries, from boards of trade interested in the growth of different localities in the State, from the press, from manufacturers seeking general information for *present* data respecting the industries. Information, for instance, may be requested as to wages or earnings. What is wanted are not wages or earnings six, eight, possibly nine, years ago, but present wages. How do they compare with output? What relation do they bear to persons employed? Suppose, for example, average yearly earnings are desired for the industries already referred to, and the question is asked in 1895,— what answer is afforded by the annual statistics?

It is given in the following table for the five leading industries in comparison with the figures from the census:—

AVERAGE YEARLY EARNINGS.

Industries.	Annual Statistics, 1895.	Census, 1895.
Cotton goods.....	\$336.77	\$330.24
Woollen goods.....	370.99	368.14
Worsted goods.....	365.17	363.52
Paper and paper goods.....	405.57	406.22
Boots and shoes.....	482.60	472.62

Note the correspondence of the figures. If the annual statistics are as trustworthy as the census in this year, why not in any other year?

Suppose, to carry the illustration in this direction still farther, we are passing through an industrial depression affecting output, employment, earnings; all of which topics are then of vital public interest. On these points, as affected by the conditions which then exist, the census affords no light. This deficiency can only be supplied by a return made at the time.

Suppose, too, that the census year happens to fall before the wave of depression has spent its force, and all the ten-year measurements of growth must be based upon returns taken in a year of great depression as against those made in a year of prosperity. Are not the deductions sure to be misleading? This, of course, is admitted, but the point is raised that the annual statistics afford no standard by which the effect of the depression may be measured. I think it is clear from what I have said that the fact is otherwise, and that the full effect of the depression, its relation to the normal output of our industries, its effect upon employment and wages, can be shown either graphically or by figures, and that thereby certain things, which, when the census of 1895 is published, would otherwise appear quite inexplicable, may be fully and fairly explained.

It is true that to an extent "its record is found in various trade data and in the reports of certain newspapers," but no complete statement as to any single industry can be made from such information however complete any part of it may

be in itself. The facts come from different sources; they have no direct relation to one another. Where, for instance, can we find, or from what source compile, any fair statement of the output of the different industries of Massachusetts during the present period? How determine the fluctuations of employment or the course of wages? I do not mean for particular industries, but over the whole field. Yet these are instances of the kind of information that is demanded. The condition of our industries is not shown in this way by newspaper reports, and if it were, no newspaper reports can take the place in validity and authority of official statistics, regularly collected and carefully analyzed.

And I think it is worth something historically to have authoritative data, showing the course of industrial conditions through a series of years, carefully compiled from original sources, upon substantially the same basis from year to year. The plan adopted in the reports upon the annual statistics is to compare the returns of two successive years, and to use in these comparisons only those returns which are made from identical establishments in each of the years compared. This makes it certain that the results will be drawn from returns made upon the same basis in year, and at least free from the introduction of dissimilar elements which so frequently tend to vitiate comparisons and render them misleading. This is a step toward accuracy at the source and must of itself make the results more trustworthy.

The returns thus afford data from year to year as definite and exact as the census returns themselves. They do not, it is true, give us exact numerical totals over the wide field covered by the census, although, as we have seen, such totals may be closely estimated from them; but for comparisons and relative statements or deductions based upon percentages they may be accepted without question; and it is this use of statistics that is most important. To say, for example, that there were 496,920 persons in Boston in 1895, as against 448,477 in 1890, does not of itself mean much; but to say that the increase has been 11 per cent, or a gain of 11 persons

upon every 100, within this period makes a distinct mental impression. To say, similarly, that the increase in the output of cotton goods in 1895, as against 1894, is 10 per cent is the important fact; the numbers upon which the percentages are based are comparatively unimportant. And if this and similar facts can be determined by the annual statistics within a reasonable degree of accuracy, they are, so far, as valuable as if determined from a census.

Take, as another illustration of what I mean, two or three of the more common statistical comparisons that are drawn from the census, such as the percentages of industry product (by which I mean the value of product created in the industry after deducting the value of stock and materials used) paid in wages, devoted to profit and other expenses, and the percentage which this last portion of product constitutes of capital invested. Such comparisons are made in the following table for the five leading industries in Massachusetts, the percentages derived from the annual statistics and from the census being placed in parallel columns:—

Industries.	ANNUAL STATISTICS — 1895.			CENSUS — 1895.		
	Percentages of Industry Product —		Percentage of Profit and Minor Expense Fund of Capital Invested.	Percentages of Industry Product —		Percentage of Profit and Minor Expense Fund of Capital Invested.
	Paid in Wages.	Devoted to Profit and Minor Expenses.		Paid in Wages.	Devoted to Profit and Minor Expenses.	
Cotton goods.....	60.49	39.51	14.76	60.75	39.25	15.04
Woollen goods.....	57.08	42.92	20.53	58.25	41.75	20.59
Worsted goods.....	60.15	39.85	18.95	60.06	39.94	19.13
Paper and paper goods	46.32	53.68	22.18	47.48	52.52	20.84
Boots and shoes.....	60.61	39.39	58.44	60.33	39.67	59.61

Here it will be seen that the results are in extremely close correspondence, showing, of course, that the small variations between the aggregates estimated from the annual statistics and those derived from the census do not affect such comparisons, because the variations in each of the

elements, *i. e.*, capital invested, stock used, goods made, and wages, have equal force, so that the conclusions as to the relation of wages to industry product or of the profit and expense fund to industry product, or of the latter to capital, are equally exact and are not materially different whether based upon the information derived from one source or the other.

The plan of basing conclusions upon a limited number of similar cases is by no means new, and, indeed, is universally accepted in statistical investigation. Witness, to take an important example, the crop return of the United States. The accuracy of the results does not depend upon the number of cases included, but upon the fact that the cases included are typical; and this is to be determined by the results when measured, if possible, by some absolute standard outside themselves, or by results obtained over the same field in a parallel investigation. In that way I have tested the annual statistics in Massachusetts. Such annual returns do not constitute a complete census. That claim has never been made for them. A census has its uses, obvious and established, which need not be enlarged upon here. They also have their uses, which I have sufficiently presented. Each method of inquiry supplements the other, corrects its defects, and enables us to make the necessary allowances that almost all statistical documents demand before their conclusions can be accepted. The annual statistics in Massachusetts have thus far abundantly shown their usefulness, and they are certain to improve. The returns of the last five years in many of the industries are much more exact and satisfactory than during the first five years, and they will inevitably gain in fullness and accuracy.

I should be sorry to be obliged to support every statement that may have appeared from time to time in these annual reports. Frequently statements seem warranted that subsequent investigation will not sustain. The work was new when undertaken in 1886, and it would be strange if some mistakes had not been made in plan and in arrangement.

Some industries, from the exigencies of the case, have been treated more fully than others, with correspondingly satisfactory results. During the first five years the boot and shoe industry did not receive the attention its importance demands, only about 33 per cent of its product having been covered. But since, with the greater efficiency resulting from permanance and experience, it has been brought up to the position of the other leading industries. Brevity of time, the pressure of other work in the Department, and due regard to economy have forced the office to compare a fewer number of schedules in some years than in others. These considerations have also influenced the date of publication of the reports, which, however, have gone out within a few months after the schedules were received from the manufacturers, except when the Department was burdened with the work of the Decennial Census, obliging us to delay publication. This, however, is rapid work, when it is borne in mind that the collection is not undertaken until after the close of the year, in order that the record of the previous twelve months may be fully made up in the establishments, and when the convenience of the manufacturer is consulted by the office, which has always proceeded upon the theory that no one should be harassed or unduly pressed in this matter.

The success of the reports has been largely due to the coöperation of the manufacturers who have, as a rule, cheerfully complied with the statute under which they are prepared, and the Department aims to reduce the labor or inconvenience of making the return as far as possible by simplifying and condensing the inquiries, and otherwise. If the manufacturers could file the schedule in the office by February 1st, the reports might be issued in April. But, as in the collection of census returns, considerable latitude must be given, and properly given, under the circumstances.

I regret the controversial tone this paper seems to assume in parts. I have neither time nor taste for controversy over figures; but I think it essential that the real value of the annual statistics of manufactures in Massachusetts should appear, and, I am sure, Mr. North desires nothing more.

Remarks by S. N. D. North.

By Mr. Wadlin's courtesy, I have had the privilege of examining his paper on the *Annual Statistics of Massachusetts*, in reply to certain criticisms incidentally made in the December (1897) *Bulletin of the National Association of Wool Manufacturers*. Like Mr. Wadlin, I have no desire to discuss the question in any controversial spirit; but both of us will welcome any discussion which may possibly promote the scientific value of the statistical work of the government, state or national. The importance of the question now raised is obvious; for if the plan of collecting annual statistics of manufactures in vogue in Massachusetts is as valuable and advantageous as Mr. Wadlin believes it to be, it should not only be extended to other states, but made the basis of a radical change in the methods of collecting and presenting this class of data. If, on the contrary, it seems open to serious criticism, the nature of that criticism should be carefully examined, and the practical utility of these annual reports definitely determined. To that end, I venture to make the following comments upon Mr. Wadlin's paper.

My original criticism upon the Massachusetts annual statistics was two fold;—first, that they do not afford an accurate standard by which to measure the industrial growth of a community or commonwealth; and, secondly, that, failing to do this, they do not accomplish any other practical purpose sufficient to warrant their constant compilation. Further study of the question, with Mr. Wadlin's paper before me, convinces me that both propositions are sound.

The last annual report of the Bureau of Statistics of Labor shows 4609 establishments covered for the year 1895, making goods to the value of \$569,097,021; whereas the decennial census of that year, embracing presumably 26,000 establishments (Mr. Wadlin does not state the number), produced goods to the value of \$849,807,302. In other words, by covering one-sixth of the establishments of the State, he secures two-thirds of the total product; and his contention is, that this is so large a proportion of the total product as to make the data presented a safe and correct criterion for judging the present condition of all the establishments of the State. We may concede, with certain limitations, the soundness of that contention, so far as it relates to the eight or nine leading industries. At the same time, I do not hesitate to affirm that a more satisfactory and a more scientific result

would accrue, if the Bureau of Labor Statistics were to pick out three or four leading industries, say cotton, wool, boots and shoes, and machinery, and present for each of these a complete annual report, leaving the status of the other industries to be judged by the status of these typical groups. So far as the record went, it would then be a record of growth, and, as an index of business conditions, it would possess decided advantages over the method now in vogue. So far as it went, it would be an absolute standard of measurement; and many of the uncertainties, perplexities, and limitations which continually confront and annoy the student of the present annual reports would be eliminated. While I question the necessity for any annual returns, I believe that if they must be had they should be made in the manner that will make them the most generally useful and the most easily understood. As the reports are now made, they have too many of the characteristics of a mathematical puzzle.

Mr. Wadlin makes it clear that our census methods of reporting manufacturing statistics confound two things which are not at all alike, and the grouping of which in the same series of tabulations is not strictly scientific;—the factory manufacture and the shop manufacture,—as we may call it for lack of a more definite designation. The conditions which govern production in the two are certainly not the same; and we may hope that a time will come when it will be possible to properly differentiate them in both state and federal censuses of manufactures. To so differentiate them appears to be a large part of Mr. Wadlin's plan in this branch of his work. Heartily approving of the idea, the question remains whether his method is the one best adapted to that purpose.

In the first place it is a departure from the purpose for which the annual statistics were originally authorized by the legislature. The law of 1896 under which the annual statistics are taken did away altogether with the decennial census of manufactures. The language of the first report under that law leaves no room to doubt that it was the original intention of the Bureau of Labor Statistics, as well as of the law makers, to make the annual account a complete although abbreviated substitute for the decennial census of manufactures. Mr. Wadlin says that he has not seen his way clear to abandoning the enumeration of the minor industrial establishments,—the shop, semi-professional and hand industries omitted from the annual account; and, hence, when the time came, the decennial census of 1895 was

taken as before. Clearly, therefore, the original purpose of the annual account — to do away with the decennial census — has failed. We are to inquire, then, whether there are other purposes sufficient to warrant their continuance; whether the annual account is a satisfactory presentation of the factory industry as distinguished from the shop industry; and whether there is any secondary purpose served important enough to justify the State in requiring so large a body of manufacturers to make not only an annual report, but, every fifth year, two reports of their year's business.

In the report for 1887 it is stated that the purpose of these statistics is "to ascertain whether or not the volume of production is keeping pace with the past, and to determine our industrial condition from year to year."

The first of these two purposes cannot be satisfactorily accomplished so long as there is a constant variation in one of the main factors of comparison and no record of the actual increase or decrease in that factor. I refer to the number of establishments considered. The comparison of identical establishments, from year to year, determines the relative condition of these identical establishments in the two years. It indicates whether their production has been greater or less in value. Mr. Wadlin adds that an elaborate system of percentages carried over from one year to another will ascertain with close approximation the actual growth of any industry or of all the industries of the State, between any two given years, with a decennial census as a starting point. He apparently demonstrates this by numerous examples, comparing 1885 and 1890, and 1890 and 1895. But these examples are nothing more than curious and interesting coincidences. No percentage calculated upon certain fixed and given things, such as a group of identical establishments, can be a reliable percentage for calculating certain other and different things not within purview. The accidental coincidence may frequently appear; but the procedure is none the less an hypothesis. Mr. Wadlin's figures are based on the assumption that the product of new establishments started in any year, or others discontinued in that year, is directly proportional to the increased product, or the decreased product, of the establishments continuing to do business and reporting to the Bureau. If the figures seem to justify the assumption, it can only be described as an instance of remarkable good luck on the

part of the Bureau ; for, in the nature of things, there can be no such actual relationship.

This fact can be illustrated by the cotton manufacture. There is much interest today to know how this industry stands in Massachusetts as compared with its position in 1890. I cannot ascertain from the annual statistics. The relative spindle capacity at the two epochs is not given. The actual number of mills in operation at the two epochs is not given. In the first year reports are presented from 157 mills producing goods worth \$90,063,203. In 1896 the reports are for 169 mills producing \$87,146,004 worth of goods. These 169 establishments are employing \$112,902,817 capital in 1896 as against \$115,474,265 employed by 157 mills in 1890. Has the capital employed by our cotton mills decreased by that amount in the five years ? From the increase in mills it should have considerably increased. The value of cotton goods made in the State should have increased for the same reason, after making all allowance for the decrease in the market value of goods which has occurred in the interim. On the face of the figures it appears here to be about \$3,000,000 less than in 1890. On their face, at least, the figures are misleading, and any attempt to get at the real fact by a resort to percentages of increase and decrease, based upon the returns of a constantly varying number of mills, is hopelessly confusing, uncertain, and untrustworthy. In a word, the statistics do not enable us "to ascertain whether or not the volume of business is keeping pace with the past." The reason why is that there have been a number of new mills established in the State since 1890, largely increasing its producing capacity ; what relationship these new mills bear to the problem, in the comparisons between 1890 and 1896, we are unable to determine. In any comparison between the two years, based upon identical establishments, they clearly cannot figure. The difficulty is that in both years we have not an absolute but a relative standard, this relative standard varying from year to year not with the actual variation in the number of mills in operation, but with the variation in the number of mills compared. Percentages in the compilation of which these accidental variations have so much to do are dangerous, to say the least. That Mr. Wadlin himself is of this opinion, I judge from the recent *Bulletin* on the cotton manufacture. The *Bulletin* is an admirable presentation of the statistical status of the Massachusetts cotton industry ; but it entirely overlooks the phase of the subject we are

discussing,—the most important phase of all. If Mr. Wadlin could ascertain the fact from the annual statistics, and demonstrate it therefrom, I think he would not have omitted to do so.

The *Bulletin* in question presents from the annual statistics the details of the cotton manufacture of Fall River, New Bedford, Lawrence, and Lowell so far as the office had the returns of identical establishments for the years 1890–1897. They are confined in New Bedford to nine mills, and they indicate that the nine mills in question made in 1897, \$9,338,283 in products as against \$8,841,869 in 1890. That is interesting and important. But in the meanwhile there were 18 cotton mills in New Bedford in 1897, and the system of comparing identical establishments compels half of them to be left out of the account. In other words, the annual statistics are not a *measure of growth*, and, therefore, they cannot accomplish the first of the two objects which Mr. Wadlin has assigned to these compilations. No system of computation based upon identical establishments, and those only, can be a measure of growth, except as to the growth of those identical establishments.

Nor is it a successful answer to this criticism to say that “the plan of basing conclusions upon a limited number of similar cases is universally accepted in statistical investigation,” and to instance the crop returns of the United States. Indeed, the illustration is fatal to this contention. Any estimate of the year's wheat crop, based only upon the average yield per acre, as compared with the average yield of the previous year, would be fatally defective. It must also take equal cognizance of the actual increase or decrease in the acreage. Crop estimates are based upon these two elements. Mr. Wadlin's estimates, which should also be based upon two elements, take cognizance of but one. They compare the relative production of identical establishments, but they take no cognizance of actual increase or decrease in the productive forces of manufacture.

As to the second purpose of these statistics, above stated, “to determine our industrial condition from year to year,” the utility of the annual statistics is not so much a statistical as a practical question; and opinions may differ widely. That Mr. Wadlin is convinced of their great practical value I have no doubt. That we can learn some things from them of interest, I admit. Whether the things we learn in comparison with the things we would like to learn but cannot are worth learning every year, is a fair question.

The annual fluctuations reported in the amount of capital employed are of no value or significance. As capital is reported, either to national censuses or the Massachusetts annual reports, it is a valueless contribution to statistical data, including as it does borrowed money and the raw materials purchased with borrowed money, and varying as it must according to the exigencies of the particular period when the report is made. If the returns of capital are valueless, the annual calculation of "percentage of profit and minor expense fund to capital" is valueless; and the variations in this percentage which occur from year to year are of no moment or statistical significance.

Variations in the value of gross product from year to year are due wholly to two causes: first, variation in quantity of output; second, variation in market value of output, *i. e.*, prices. The annual statistics of Massachusetts take cognizance of neither of these two elements. To actually accomplish the purpose of showing "the trend of business from year to year" they must necessarily take cognizance of both. The "trend of business" can only be statistically shown by showing the relationship of volume and value from time to time. Since the annual statistics cannot do this, in the nature of things, we question the practical utility of an annual report on the part of the State showing value alone; because value alone cannot accomplish the end sought, and the items omitted are the elements whose presence is absolutely necessary to form correct conclusions from the figures which indicate value.

This criticism applies equally to many of the subsequent calculations made in the summary analyses of the reports.

The value of the "stock used" varies from year to year, not simply with the output of goods, but with every fluctuation in the prices of raw materials.

The "industry product" varies in value in keeping with the variation in prices of two absent elements, *viz.*, the prices of goods and the prices of raw materials; and the percentage figures of the reports are thus vitiated from both ends.

When we come to "the relationship of wages to value of gross product" we have a series of fluctuating percentages which are assumed to indicate what proportion of the total value of the proceeds of industry goes to the wage earners in each year as compared with the prior year, but which in reality do nothing of the kind. The fluctuations are sometimes quite wide; in the cotton manufacture

they vary from 55.41 per cent in 1888 to 70.19 per cent in 1896 ; and as between the several industries they vary (in 1896) from 47.52 per cent in paper and paper goods to 70.19 in cottons. These percentages of course largely depend, as between the different industries, upon the relative cost of the raw materials employed to create a given product. Their variations are chiefly determined in identical industries by the varying prices of raw materials and finished goods. Their significance it is hard to see, and their only effect must be to mislead. They are not in any way indicative of a change in wages. They do not prove a larger or smaller margin of profit, because they are based upon too many elements of variation. They can indicate nothing which throws any light upon "the trend of business" or the relations of labor and capital, or anything whatsoever. They may possess a certain interest for the curious, but their calculation and presentation year after year, as though they were in some sense a factor in reaching definite conclusions as to business conditions, or were of intrinsic statistical or sociological significance, is not only not justified, but ought, in my judgment, to be condemned and stopped, as tending to promulgate error. Any theory of business conditions, either by the business man or the statistician or the doctrinaire based upon these annual fluctuations in the percentages of "industry product paid in wages," is certain to be misleading, because they have no relationship to any causes or conditions of which the report takes cognizance.

It would be easy if it were worth while to carry these criticisms to many other similar calculations and percentages contained in the annual statistics. Enough has been said to show that the annual statistics (1) are not a substitute for the decennial census of manufactures ; (2) that they are not a safe measure of industrial growth ; and (3) that they are not a true guide to "the trend of business." In asserting all this, I do not wish to be understood as denying that interesting and important facts are brought out in these annual reports ; but I raise the broad question whether the State of Massachusetts has adopted the best method of rectifying the criticism upon decennial censuses of manufactures, which springs from the fact that one may be taken at a period of great prosperity and another at a period of great business depression, and comparisons between the two may thus be greatly misleading. The true remedy, I believe, is the quinquennial census of manufactures by the state or the nation,

or by both in coöperation. Intervals of five years are sufficiently close together to meet the criticism above mentioned. Five-year periods are as frequent as it is necessary or desirable to gather such statistics. The fluctuations that occur in wages, in numbers of employes, in product, when measured by five-year periods, will accomplish all the statistical, economic, and sociological purposes which the Government has in view in authorizing this class of investigations. Mr. Wadlin says that there is a constant and increasing demand for *present* data on all these points. I agree with him as to the importance of early availability for such statistics. But I believe him entirely mistaken in supposing that there is any real advantage to knowledge, to society, or to industry in serving them up every year and thus indefinitely multiplying the points of comparison. There is as much danger of too many statistics as of not enough. They may become confusing, perplexing, and superfluous.

To secure the highest utility for the statistical work of the Bureau, Mr. Wadlin might well consider the advisability of substituting for the annual reports a new five-year inquiry midway between the decennial censuses, and confined to the actual manufacturing establishments of the State as contrasted with the shops. He informs us that he has already so systematized his work that it would be possible to make exact comparisons with the similar establishments reported in the larger work. From such five-year censuses it would be possible to measure the actual industrial growth of the State, abandoning all this elaborate series of percentage measurements, and comparisons of identical establishments, and presenting all the data regarding wages, product, etc., which is now repeated annually, in a manner that would amply satisfy the requirements of statistical science and sociological inquiry.

S. N. D. NORTH.

Boston, Mass.

REVIEWS AND MISCELLANY.

THE WORKMAN IN BERLIN.

Recent statistics on the condition of the working classes in Berlin, published by the director of municipal statistics, are reviewed by A. Raffalovich in a March issue of *L'Economiste Français*. The number of laborers or salaried employes of both sexes has increased out of proportion to the increase in population. In 1800 there were about 30,000 employes in Berlin; in 1816, of a population of 182,800, there were 43,700 laborers, using the word in its broadest sense; in 1846, of 390,000 inhabitants, 96,500 were laborers; in 1895 the city had a population of 1,678,000, and 320,000 male and 185,000 female wage-earners. Estimating per thousand inhabitants, the proportion of wage-earners stands as follows:—

	Laborers.	Domestics.
Berlin	524	38
Dortmund	637	27
Aix-la-chapelle	557	35
Dusseldorf	552	36
Leipzig	517	31
Frankfort	432	33
Strasbourg	419	38

According to the census of occupations of 1895 there were in Berlin 18,000 locksmiths, 6400 shoemakers, 19,512 cabinetmakers and joiners, 17,000 workmen in building trades, 13,000 masons, 3200 painters, 10,200 printers, 9400 tailors, 3800 tailoresses, 25,000 seamstresses, 8100 laundresses, 11,254 male and 9873 female servants in hotels, 7171 male and 59,918 female domestics.

The housing of this great laboring class, and of the poor, has long been an object of attention in Berlin. As early as 1796 the dangers of poor ventilation and general unwholesomeness were noticed, while in 1844 an agitation was raised which has continued to the present day. In 1861 there were, on an average, 48 inmates to a tenement house, 57 in 1871, and 73 in 1890. The average annual rent, in marks, has been:—

	1880.	1885.	1890.
Per room	221	235	248
Per inmate	119	122	127

The share of rent in the cost of living is evidently increasing. A characteristic feature in the lodging of the population of Berlin is the large number of "furnished rooms" for night-lodgers. In 1890, 56 per cent of the families had one night-lodger; 29 per cent had two, and 10 per cent three. Some districts of Berlin are densely populated. A private investigation of 781 houses, undertaken in 1893, to ascertain the pecuniary return from the rental of a cubic meter of air, proved it to be in 75 per cent of the cases from two to three marks a year. Various efforts have been made to improve sanitary conditions. In 1848 there was organized in Berlin, under the name of *Berliner gemeinnützige Baugesellschaft*, a society for the purpose of constructing sanitary dwellings at low cost and of aiding the occupants to become owners. At the end of 1895 this society had 59 buildings with 580 tenements and 1906 tenants. The rent varies from 100 to 500 marks a year. The Berlin Building Association was formed in 1886 with the particular aim of building cheap homes in the suburbs for workmen. The entrance fee is two marks, the shares 200 marks, contributed in weekly payments; the dividend paid is five per cent. This society has 809 members, and had in 1895 built 149 homes, of which 75, with a total value of 1,120,266 marks, mortgaged for 670,500 marks, had been deeded to members. There have been various other attempts along the same line and several other societies formed, of which the *Deutsche Volksbau Gesellschaft* and the *Berliner Spar und Bauverein* may be especially mentioned.

The death rate in the districts where the workmen live is high. This is due to the great number of births and the excessive mortality among new-born infants. In the well-to-do and rich quarters of the city the mortality of new-born infants is from 148 to 192 per thousand, but in the poorer districts it rises to 346 per thousand. It is quite difficult to obtain statistics as to illness in the laboring classes. The following table from the *Gewerkskrankenverein* may give some idea of the amount:—

	1892.	1895.
Average number of members	285,644	92,053
Illnesses	199,461	93,186
Per cent of sick	97	101
Injuries	13,192	5,892

The mortality from tuberculosis is enormous, one-fourth of the deaths of males and one-third of the deaths of females being due to this disease. Dr. Sommerfeld attributes 60 per cent of the deaths

among cigarmakers to diseases of the lungs; among painters, 55 per cent; printers, 44 per cent; bookbinders, 57 per cent; masons, 38 per cent; and 29 per cent among butchers.

In Germany compulsory insurance is one of the most important measures adopted for the protection of the workman. The municipal authorities in 1850 introduced compulsory insurance against illness for the employes of stores and manufactories in Berlin. The men were obliged to subscribe to a benefit fund. In 1854 these benefit funds numbered 74 with 34,460 members, and assessments of 675 thalers from the employers and 86,318 thalers from the employes. The statistics of benefit funds in 1895 were as follows:—

	Local Funds.	Funds of Manufactories.	Funds of Societies.	State Funds.	Free Funds.
Funds.....	59	29	18	2	36
Members, male.....	209,185	35,752	17,903	19,063	19,222
Members, female....	96,051	4,247	4,930	1,224	7,069
Receipts.....	m. 8,841,977	m. 1,263,236	m. 472,316	m. 460,090	m. 646,184
Expenses.....	m. 8,460,890	m. 1,213,588	m. 436,871	m. 459,639	m. 604,882
Physicians' fees.....	774,330	157,828	34,000	79,000	65,975
Drugs.....	994,081	163,000	41,303	62,000	58,744
Indemnities.....	2,676,698	527,226	118,853	210,343	221,000
Days ill.....	2,682,000	401,301	138,515	125,308	154,965

About 415,000 persons are insured against illness, and 539,000 against old age and disability. For the latter 5,429,000 marks in assessments has been contributed, 580,000 marks paid in pensions, and 105,000 marks returned to women who have married. Over 200,000 workmen are insured against accidents, the building trades furnishing about a fourth of that number. There are from 4000 to 5000 accidents annually. Ten medical stations with beds have been provided so that immediate attention may render the period of incapacity as short as possible.

Since 1870 Berlin has provided free instruction in the primary school grades. In 1896 there were 147 communal schools with 190,462 pupils, comprising two-thirds of the children of Berlin, at a total expense of 10,500,000 marks, or 56½ marks per child. The course includes four hours each of religion, writing, reading, and arithmetic, and two of history, geography, natural history, geometry, drawing, singing, and gymnasium. A strong effort has been made

to put supplementary courses within the reach of wage-earning children by evening and Sunday instruction.

Another feature of advantage to the workman is the inspection of factories. This was carried out in 1895 by a chief-inspector, three assistant inspectors, and four deputies. There were 4770 establishments with 150,288 workmen, of whom 104,000 were males above 16, 37,416 women, 4754 youths between 14 and 16 years of age, and 3351 young girls. Half of these establishments were inspected, but a good part of the investigation was limited to an inspection of the steam boilers. One of the chief duties of the inspector is to be a mediator between employer and employee, that is, an instrument of reconciliation. Each Friday evening, and twice a month on Sunday, he must be at the disposal of the employees who wish to consult him, but the number who do so is not large.

The industrial tribunal (*Gewerbegericht*) before which cases between employer and employee are tried has been in operation several years. The judges are named by the city and are assisted by elected deputies consisting of an equal number of employers and employees. In 1898 the employers brought complaint in 356 cases only; in 1894, 216; and in 1895, 386. The greater part of the cases are concerned with law suits for the payment of wages or indemnity for dismissal. Forty per cent of the suits were terminated by reconciliation, 19 per cent by the withdrawal of the plaintiff, 13 per cent by default.

Berlin has an attraction for the people of the provinces, not only, as is often believed, on account of the pleasures of city life which it offers, but even more by the seemingly superior opportunities for work and higher earnings. Consequently there has been an enormous influx of provincials to the capital, who, upon reaching the railway station, become at once a prey to the solicitors of employment bureaux. These bureaux demand a high commission, and their proprietors make large profits. One class of employment bureaux consists of agencies established by the employers, as, for example, the bureau for metal workers, which in 1896 found situations for 21,281 men. The workmen on their part have also organized labor exchanges. In the brewing trade there is a bureau administered jointly by four employers and four employees. Enrollment costs 20 pfennigs, and in case of obtaining a situation the applicant gives six marks and the employer three marks to an aid fund. In 1896, 5000 marks

were laid aside, 2200 marks spent, 1709 men placed in permanent and 2372 in temporary situations. In 1883 a central employment association was established by private initiative, which, in coöperation with the municipal authorities, found places in 1896 for 11,318 coachmen, day-laborers, etc., 4630 painters, 1483 locksmiths, 1300 plumbers, 155 masons, and 1662 women. The newspapers gave valuable assistance either by gratuitous insertion of "wants" or by the free distribution of leaflets containing offers of employment.

Hirschberg's figures on the wages of unskilled labor show that Berlin ranks with Frankfort and Hamburg: —

	Adult Males.		Adult Females.	
	1884.	1892.	1884.	1892.
Berlin.....	m. 2.40	m. 2.70	m. 1.50	m. 1.50
Aix-la-chapelle..	2.00	2.10	1.20	1.40
Breslau.....	1.60	2.00	1.00	1.10
Elberfeld.....	2.40	2.40	1.50	1.50
Frankfort.....	2.40	2.50	1.70	1.80
Hamburg.....	2.50	3.00	1.85	2.00
Cologne.....	2.50	2.50	1.50	1.50

The skilled workman is of course better paid. Omnibus drivers and others engaged in transportation earn from three to five marks per day. Wages of tailors are not so good, since the men earn only 12 to 15 marks a week, and the women finishers 8.50 to 15 marks a week. The nominal wages of domestic servants are little higher, but they are lodged and fed.

	Lowest.	Medium.	Highest.
Maid of all work..	m. 135	m. 165	m. 240
Child's nurse.....	105	150	180
Cook.....	180	210	300
Sick nurse.....	240	300	360

Counting living expenses at 1 mark per day these wages are comparatively good.

ALICE RHINEHART CALLAWAY.

GOLD IN ACTUAL CIRCULATION.

The following letter from the Secretary of the Treasury, under date of April 18, 1898, relates to the amount of gold in actual circulation, method of computation, and the amount of United States paper money which will never be presented for redemption :—

Sir :— I have the honor to acknowledge receipt of Senate resolution dated the 5th instant, as follows :—

RESOLVED, That the Secretary of the Treasury be directed to inform the Senate how he ascertains the amount of gold in actual circulation, after deducting the reserves in the Treasury and in the banks, and if he has any actual statistics upon which to base his statement; and also to inform the Senate whether he makes any allowance for the wear and loss of the paper circulation of the Government in his Treasury statement, or does he assume that there is no diminution of the amount of paper money in circulation by reason of wear and loss.

In reply the Senate is respectfully informed that the starting point of the estimate of the stock of gold in the United States is the calculation made of the stock June 30, 1872, by Dr. Henry R. Linderman, then Director of the Mint. At that period there was no gold in active circulation in the United States (except on the Pacific coast), and the estimate comprised only the metallic stock in the Treasury and national banks, with an estimate of \$20,000,000 as a minimum in use on the Pacific coast, and an allowance of \$10,000,000 for that in State and private banks and private hoards. Dr. Linderman's aggregate was \$128,889,864.49. The estimates from year to year since 1873 have been arrived at by adding to the stock of coin at that date the annual coinage and amount of domestic coin imported, deducting the loss by recoinage of United States coin, the amount exported, and estimated as used in the industrial arts.

The amount exported and imported is obtained from the custom-house officials at the ports of entry, except what may be taken out or brought in by individuals in their private possession. That would be small, and the outgo and income are assumed to offset each other, as parties going abroad or returning usually convert their pocket change at the point of departure or on arrival.

The estimate of the amount used in the industrial arts is based upon several censuses made by the Bureau of the Mint and upon

annual reports received from private smelters and refiners. Manufacturing jewelers, doing any considerable business, prefer to buy refined bars rather than use coin, because by so doing they get full weight while by using coin they lose by whatever amount the coin is abraded. The coin melted down by refiners is usually mutilated or under weight, and bought by them at its bullion value. The amount of coin melted down by small manufacturers is estimated from the returns obtained by circulars sent to all the jewelers in the United States whose names appear in directories.

It is not believed that any officer of the Government has assumed that there is no diminution of the amount of paper money in circulation by reason of wear and loss, but the official reports published by the Department from time to time contain no allowance for such loss because there is no authority of law for making any reduction, on that account, of the stated liabilities of the United States. The subject has been considered from time to time and estimates have been made of the probable loss, the latest of which, recently made by the actuary of the Department, is as follows:—

**ESTIMATE OF THE AMOUNT OF UNITED STATES PAPER MONEY THAT WILL NEVER
BE PRESENTED FOR REDEMPTION.**

Kind.	Total Issued, Including Reissues.	Amount Outstanding.	Estimated Loss.
United States notes.....	\$2,854,525,808	\$346,681,016	\$5,488,900
Treasury notes of 1890.....	371,073,000	114,867,280	55,770
Gold certificates.....	1,506,039,300	38,782,169	207,600
Silver certificates.....	1,426,790,000	375,479,504	711,900
Currency certificates.....	1,380,250,000	62,340,000	.....
Summary of United States issues...	7,538,678,108	938,149,969	6,464,000
National bank notes.....	2,064,079,225	230,016,225	6,581,300
Total.....	9,602,757,333	1,168,166,194	13,045,300

Respectfully yours,

L. J. GAGE, *Secretary.*

THE PRESIDENT OF THE SENATE.

IMPORT AND EXPORT VALUATIONS.

The following letter, dated London, May 25, 1898, is taken from *The Manufacturer*, June 4 :—

The Manufacturer for April 9th (page 16) contained a very interesting article on the difference in the official value of our exports to France, as shown in the Washington returns, and the French value of our imports into France, as shown in the French official statistics. Two samples will show the gist of the writer's contention :—

	French Statistics.	American Statistics.
1896	\$60,885,946	\$58,848,571
1897	84,088,269	78,665,199

The above are the values of the American exports to France, and the French customs officials' value of French imports from United States. The discrepancies are at once apparent.

The imports from France into United States, as shown by Washington, and France's exports to United States, as shown by the French authorities, are as under :—

	French Statistics.	American Statistics.
1896	\$43,214,520	\$55,694,541
1897	47,847,115	66,780,631

Here again we have a radical error, although where it is located is a difficult matter to say. Much the same result is seen from an examination of the British trade returns. Of course exports should have a higher value when landed at their destination; costs, freightage, and other expenses being added. Under these circumstances I have laid the matter (so far as British statistics are concerned) before the chief of the English Customs Department, and this is his explanation :—

"It has always been found impossible to establish a correspondence between the United States exports to this country (England), as given in their returns, and the British imports from the United States, as given in our returns. The reasons for this disagreement are numerous. In the first place it would be necessary, if both sets of figures were to correspond, that the terminology of the two countries should be identical—that is to say, that both countries should attach exactly the same meaning to the same words and

expressions in their several imports and exports lists. Thus, as regards the iron and steel manufactures, the British heading of that category does not include hardware, agricultural implements, machinery, printing presses, typewriters, etc., most of which apparently fall under the United States heading of 'iron and steel,' while the sum mentioned as the British total does not include the value for sewing machines.

"And then," continued the British statistical expert, "there is another reason for these discrepancies—the British returns are classified according to the countries whence the goods are immediately imported. In this way it is undoubted that goods really of United States origin are classified as from Canada, and *vice versa*; in the winter season when Canadian ports are closed the goods of that Dependency are imported into England as from the United States.

"The system we adopt in England is a valuation of both imports and exports according to the bills of entry and the shipping bills, false declarations being punishable by fine. In the case of imports, the control of the customs administration, at least in so far as regards those articles which are subject to duty, is a guarantee of accuracy in the returns; but as regards the exports it is different, for merchants are only required to furnish their declarations within a period of six days of the sailing of the vessel, and the only proof of their accuracy, if proof be needed, lies in an inspection of the bills of lading, the production of which the authorities have the right to demand.

"The valuation of imports and exports is checked in the statistical office of the Customs (to which a copy of the entry is sent), where the officials possess a knowledge of the current values and where market reports and lists of prices current are readily available to detect any departures from substantial accuracy in this respect. Practically, it will be seen that the important difference between the United Kingdom and other systems is that the English method shows the values at the time of import and export, while in most other countries the values are computed at the prices of a year or more before.

"For goods imported the practice adopted is generally to take the value at the port of entry, including all incidental expenses up to landing on the way. For goods consigned to the English market for sale, the market value in England is that which is sought for and which is included in the returns. This is ascertained from the dec-

laration made by the importers, and is checked by the expert knowledge available in the statistical office already mentioned. For the exports, the value at the port of shipment is taken. English statistics take cognizance only of the immediate port of origin and destination, and do not record the prime origin and ultimate destination of the goods.

"And, then, too, there is another cause of divergence between the returns of any two countries. I allude to smuggling. There is known to exist a good deal of this trade on certain frontiers, and this is carried on to such an extent as to seriously falsify the customs returns."

I may mention that in the opinion of the Chief of the British Customs House there is no reason to doubt the substantial accuracy of the English returns, nor does he think the declarations are untrustworthy. At the same time there appears to be something quite wrong in the systems, not only of England but of France and other countries, which permits of such large discrepancies as have been pointed out in this article.

F. C. CHAPPELL.

STATEMENT OF DEATH RATES.

The following letter was sent by the office of the Division of Vital Statistics of the Department of State of Michigan in reply to an inquiry from Detroit. A paragraph relating to the filing of the certificate has been omitted.

The death rates for Detroit as printed in the *Bulletin* have been worked out with great care, and you may rely on them as entirely correct on the basis of the transcripts furnished by your office. For the month of November you reported to us 265 deaths, including 21 still-births, as occurring in the city of Detroit, and the annual rate based on this number of deaths and upon the estimated population of Detroit on basis of average annual increase between the United States census of 1890 and the State census of 1894 was 12.4 per 1000. You state that the number of deaths during November was 254, exclusive of "still-births, premature births, and bodies which have died in the city which were not residents of Detroit," and upon this number and an estimated population of 275,000 you obtain a

rate of 11.24 per 1000. It will be useful to consider the causes of this discrepancy, as the official death rates issued by the city and State authorities ought to show absolute agreement.

The difference in the death rates might arise from : (1) Difference in the number of deaths reported in the month ; (2) difference in method of computing or stating annual rate ; or (3) difference in the estimate of population.

(1) The difference in the number of deaths serving as a basis for the rates depends upon four considerations, namely : (a) Inclusion or non-inclusion of still-births ; (b) inclusion or non-inclusion of premature births ; (c) inclusion or non-inclusion of deaths of non-residents ; (d) inclusion of tardy returns coming in at the beginning of the following month, and after the transcripts have been sent from your office to Lansing.

(a) The *Bulletin* includes still-births in all statements of the death rate. This is implied by the placing of still-births as a special column in all of the tables, in connection with ages, and was explicitly stated in the September *Bulletin*, page 8. As to the propriety of including still-births in the total death rate, there may be a difference of opinion. Authorities may be found on either side. We follow at present the usage of the *Michigan Registration Reports* since 1867, a usage which is shared in by many other registration offices. The European classifications generally group still-births in a distinct class, apart from deaths. The United States census includes still-births in deaths in the general tables. I may say that Mexico and the Province of Quebec, which have recently adopted an approved European form of classification (the Bertillon system) have both placed still-births in the tabular list. While on theoretical grounds it seems to me that the establishment of a separate class for still-births is desirable, with consequent exclusion from the general death rate, unless qualified, I am not at all sure that this would be best for Michigan. It is very important that all still-births be registered, and the best way at present to secure this is to treat them in all respects like other deaths. It might be well to present two alternative statements of death rates, as we have in the *Registration Reports* for some years, giving them inclusive and exclusive of still-births.

(b) I do not think that you are justified in excluding premature births from deaths. None of the standard classifications does so.

See any English Registrar-General's report, or, for the Bertillon system, the *Tableaux Mensuels* of Paris. In the latter, as stated in the explanation of terms contained in the *Annuaire Statistique* for 1888, premature births are contained in title 139, "Congenital debility, icterus and sclerema." This is the classification recommended by the Committee on Nomenclature of the American Public Health Association at the last meeting at Philadelphia, and in the report of the committee as given in the *Journal of the American Medical Association* for November 27, 1897, special reference was made to this point.

(c) Neither do I think that you are justified in leaving out of your death rate any deaths of persons who are not residents of your city. The question here is analogous to that of the census, whether a *de facto* or a *de jure* enumeration is preferable. We must choose one or the other method, and as the law at present exists we are obliged to base our death rate on the deaths that actually occurred in a district, without regard to the possible residence of the decedents. You will see that to do otherwise would be to understate the true number of deaths, for while you could exclude deaths of non-residents from the Detroit mortality, you could not include the deaths of residents of Detroit occurring in other parts of the State or in other States or countries. It is not fair to exclude one and not to include the other, and especially such deaths as might occur of invalids removing from Detroit to the West or South, and who die and are buried there.

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(2) Our methods of computation are practically identical. For convenience we multiply the total deaths by 12.2 for 30-day months, or 11.8 for 31-day months, thus converting the monthly deaths to the basis for an annual rate, and divide by the estimated population.

(3) We differ slightly in our estimate of population. As stated in the *Bulletin* all rates are based on populations estimated by average annual increase from the censuses of 1890 and 1894. There are two principal methods of estimating population, the geometrical and the arithmetical. I have shown for Michigan that the latter is theoretically and practically preferably (the same may be demonstrated for many other States in this country), and I have therefore employed it for Michigan as a whole and for several subdivisions,

including Detroit. Now any uniform system of estimation whatever will work an occasional injustice, but probably less on the whole than the use of census populations for former years (no estimates) or purely arbitrary guesses. Any rates based on directories, school censuses, and the like, have little or no statistical standing. I do not know by what method you obtained your assumed population (275,000), but it differs but little from the population used by me as stated above, namely, 261,740. Beginning with January, our rates will be based upon an estimated population for Detroit of 269,720. These differences are probably within the reasonable limits of accuracy of estimation, and make a difference in the rates of about .5 per 1000. In all cases we state rates to the first decimal place only, as to give the second implies an accuracy which few registration offices can lay claim to. We add .1 for the second place of decimals omitted, if .05 or over.

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COMPARATIVE STATISTICS OF RAILROAD RATES.

BY HENRY H. SWAIN, PH.D.

In studying financial statistics of railroad operation it is a task of almost overwhelming magnitude to compare each item of a freight schedule or a passenger tariff with corresponding items in earlier or later schedules, and so diverse would be the results of such comparisons, if accomplished, that generalization in regard to the course of rates would be almost impossible. When comparisons are undertaken between different sections or countries, the task is even more complicated, and any generalization is rendered almost impossible by the lack of correspondence between the different items of the schedule. It has therefore become a matter of great interest to statisticians to find some method of averages by which freight or passenger rates can be compared in different periods or different places. It is commonly assumed that the problem has been solved in the "ton-mile" or "passenger-mile" statistics now in very general use.

These statistics are compiled in the following manner: Each shipment of freight is reduced to the basis of one mile; for example, a consignment of twelve tons carried ninety miles is expressed as equivalent to 1080 tons carried one mile; all the shipments, after being reduced to this basis, are added

together; thus all the freight transported on railroads in the United States in the year ending June 30, 1896, was equivalent to 95,828,860,278 tons transported one mile.* For transporting this freight the railroads received \$786,615,837.† Dividing this sum by the number of tons we find that the revenue per ton-mile was .806 cent.‡

Similarly, if a passenger travels 983 miles it is counted as equivalent to 983 passengers travelling one mile. All the journeys of all the passengers are added, and we find that there were in the year 1895-96, 13,049,007,283 passengers carried one mile in the United States.§ The railroads received for this service \$266,562,533.|| Consequently, by a process of division, we get 2.019 cents as the revenue per passenger-mile.¶

Such calculations as this have about them a charm of simplicity, and if a change in the rates were the only cause which could occasion a variation in the average, this method would be as satisfactory as could be desired. That these averages really are conclusive is assumed quite widely by writers on railroad statistics. From among a multitude of possible illustrations it may suffice to quote two or three at random. The president of the Santa Fé system, in a memorial to the Kansas legislature, published in the *Railway Age* of Feb. 12, 1897, declares that his railroad has been steadily reducing freight rates in Kansas, and in proof of this he shows that the rate per ton-mile, Dec. 31, 1882, was 2.288 cents, and June 30, 1896, 1.028 cents, "making a decrease from 1882 to 1896 of 55.07 per cent." *The Eighth Annual Report of the Interstate Commerce Commission* sets forth on page 228 tables of ton-mile and passenger-mile statistics from various countries designed to show that rates in the

* *Ninth Annual Report on the Statistics of Railways*, p. 59.

† *Id.*, p. 342.

‡ *Id.*, *ib.* The correct quotient would seem to be .826.

§ *Id.*, p. 59.

|| *Id.*, p. 342.

¶ *Id.*, *ib.* Apparently it should be 2.043 cents.

United States are the "lowest in the world." The Senate Finance Report on *Wholesale Prices, Wages, and Transportation* gives a table showing the number of cents per ton-mile received for freight transportation by certain railroads in 1860 and in 1892, and this comment follows: "For the dates named this table gives a very interesting and instructive comparison. It shows a very great reduction in freight rates." The same report declares on page 614 that "no presentation of the tendency toward lower charges for freight transportation by railways is at once so comprehensive, accurate, and readily understood as a statement of the average charges per ton per mile prevailing during successive periods."

President Ripley doubtless knows whether freight rates in Kansas have been reduced in late years, though his figures fail to throw any light on the subject. It is not the purpose here to enter on the controverted question whether American rates are higher or lower than in some other countries, nor to deny that freight rates in the United States may have fallen somewhat during a period whose most marked economic characteristic has been the universal fall in general prices. But an effort will be made to show that no presentation of railroad charges is at once so misleading, inaccurate, and certain to be misunderstood as a statement of the average charges per ton per mile prevailing during successive periods. The demonstration is not difficult. It consists only of showing that the "average" rate is a resultant of several causes, and that a change in any one of these causes is quite capable of modifying the average most profoundly; in consequence it is utterly illogical to select arbitrarily a single one of these causes and attribute all fluctuations in the average solely to variations in rates.

To begin with freight rates: If all the freight transported between any two points were taken at a uniform rate regardless of the character of the commodity the case would be marvellously simplified. But as a matter of fact there are

almost as many different rates as there are kinds of goods. To make it easier to grasp the case, however, we will suppose all freight to be grouped into five classes, and in the case of two railroads of equal length the rates on each road between its termini are precisely the same, *viz.* :—

First Class	. . . . .	60 cents per cwt.
Second "	. . . . .	45 " " "
Third "	. . . . .	35 " " "
Fourth "	. . . . .	30 " " "
Fifth "	. . . . .	20 " " "

Is it not evident that, although the rates are precisely the same on the two roads, the revenue per ton-mile may be very different on the two, and that it cannot possibly be the same unless the proportion of each class of freight carried by both roads is precisely the same? Suppose, for example, that one of the termini of one road is at the center of the production of some staple commodity included in Class 5, while the other road handles little 5th class freight, except what is going to consumers along its line, is it not plain that, other things being equal, the revenue per ton-mile will be much less in the case of the first road than in the case of the second? Or, if we confine our attention to a single road at different periods it is perfectly obvious that any industrial change which increases the relative proportion of low class freight handled lowers the revenue per ton-mile, and any increase in the proportion of high grade freight raises the revenue per ton-mile, rates remaining precisely the same.*

* *The Senate Finance Report* (vol. 1, p. 43,) shows the per cent of tonnage in each class forwarded by the trunk lines from New York to and beyond the western termini in :—

	1889.	1892.
Class 1	22.2	19.9
" 2	6.9	5.4
" 3	12.8	11.3
" 4	13.0	10.4
" 5	7.8	9.6
" 6	37.3	43.4
	<hr/> 100.0	<hr/> 100.0

Here is a variation of nearly eighteen per cent in three years in the relative proportion of 5th and 6th class to higher grade freights,—a variation which is utterly ignored by the *Report* when rates are being considered.

But the cent-per-ton-mile theory assumes that a change of rate is the only cause which can make a variation in the revenue per ton-mile, and that therefore a rise or fall of the revenue per ton-mile is conclusive proof of a corresponding rise or fall of rates.

But this is only half of the story. We have confined our attention to traffic between the termini alone. Now let the way stations be inserted. It costs just as much to load and unload freight for a journey of five miles as for a journey of five hundred miles. Consequently, if a railroad company charged for freight going five miles only the bare cost of loading and unloading, and then charged one hundred times as much for transporting freight 500 miles, the latter rate would be prohibitive of almost all traffic over the longer distance. No railroad manager would think of making such a charge. In general, the longer the distance a consignment of freight is to travel the less per mile is the charge.

Now disregarding, for the sake of simplicity, the complexities of "classification," let us suppose two roads of equal length, with way stations similarly located along each, and the freight rates between any two stations on the one precisely the same as between the corresponding stations on the other. But let us assume that in one case the greater share of the business passes over the whole length of the road from one terminus to the other, but in the case of the second a greater share of the business is between the way stations. Other things being equal, it must be obvious that the revenue per ton-mile of the first road will be less than that of the second, although rates are precisely alike on both. Or, in the case of a single road over a period of time, an increase in the "way" traffic relative to the "through" business will increase the revenue per ton-mile, rates remaining just the same. But the theory under consideration necessarily implies that a change of rates is the only thing that can cause a change in the revenue per ton-mile, and that an increase or

decrease in the revenue per ton-mile is of itself conclusive proof of a corresponding increase or decrease of rates.

With slight modifications the same explanation applies to passenger business. While most of the travel in America is "first class," there are some "second class" and "emigrant" rates, and many circumstances under which a lower fare is charged on account of stricter limitations as to time. Consequently, the schedule of charges remaining precisely the same, the revenue per passenger-mile will be less the greater the proportion of passengers who travel second class or on the occasion of excursions or with mileage books.

Furthermore, as to distance, though for a different reason than in the case of freight, the fare for a very long ride is usually somewhat less per mile than for a short ride, with one exception. In the immediate environs of large cities the elasticity of demand for short distance travel is very great. Consequently, railroads favorably situated find it profitable to make such fares lower proportionately even than the charge for very long distances. We may divide passenger traffic roughly then into local, long distance, and suburban. The rates in each class remaining absolutely unchanged, the revenue per passenger-mile will be greater the shorter the average journey, except that an increase in the proportion of suburban travel lowers the revenue per passenger-mile.* But the statistical theory in question assumes it as self-evident that a change of rates must be the only cause that can possibly change the revenue per passenger-mile, and that therefore an increase or decrease of the revenue per

* The statistical report of the Interstate Commerce Commission gives these figures for the average journey travelled per passenger for a series of years. The tendency to increase is noticeable, though for reasons which cannot be detailed here the figures are absolutely much too small : —

Year.	Miles.	Year.	Miles.
1890 . . .	24.06	1894 . . .	26.43
1891 . . .	24.18	1895 . . .	24.02
1892 . . .	23.82	1896 . . .	25.50
1893 . . .	23.97		

passenger-mile is unassailable proof of a corresponding increase or decrease of passenger fares.

Finally another specific instance will show graphically the utter impossibility of discovering anything about the difference in rates between different roads or different years on the basis of any passenger-mile statistics. The city of Madison, Wisconsin, is connected with Chicago by three different railroads on each of which the fare between the two points is exactly the same and has been unchanged for a considerable number of years. But when we examine the data upon which the statistics of passenger revenue are based we find the utmost complexity. As the conductor goes through the train he finds at least six different sorts of tickets presented by passengers occupying the same car from Chicago to Madison. First there is the occasional passenger whose ticket has cost him \$3.92. There is the clergyman with his "permit" who has paid \$1.96 for the ride. There is the man who goes back and forth four or five times a year and has paid \$25 for a thousand-mile ticket; the trip costs him \$3.45. There is the man always "on the road" whose two thousand-mile book has cost him \$40 net, the proportion of which applied to this trip amounts to \$2.76. If it is summer there are the Chicago people going to the country for an outing with round-trip tickets each half of which cost \$3.18, or if they are to return the next Monday, only \$2.68. Each of these different forms has been available regularly for several years at exactly the prices named and on each of several different roads. But it must be perfectly manifest that the revenue per passenger-mile may be most radically changed by any circumstances which affect the relative proportions of these different sorts of travel to one another.

So much for one factor in the revenue per passenger-mile, the money paid. Now for the other factor, the miles travelled. The distance from Chicago to Madison by one road is 176 miles, by another from 131 to 164 miles, according to the

train taken,* and by the other from 166 to 181 miles, according to the route.† Now as the fare is just the same whichever route is taken,‡ and as there are nine different routes, each of a different length, by which regular passenger trains are run every week-day in the year, it must again be evident that the revenue per passenger-mile will depend on the proportion of the travel which goes by the different routes. It will be less on the Illinois Central than on the Northwestern, since that route is the longer. It will vary on the Northwestern and the St. Paul roads from year to year according as any slight changes of time-tables or other causes serve to make some trains more generally convenient than other trains for this particular travel.

To sum up, differences in the average receipts per passenger per mile or per ton per mile may be due to differences in the rates, or to either one of two other sets of independent causes, or to any possible combination of these. It is therefore impossible to determine, from comparisons of ton-mile or passenger-mile averages, anything whatever in regard to the differences in freight or passenger charges.

Remarks by Henry C. Adams.

The remarks by Dr. Swain upon the passenger-mile and ton-mile unit in railway statistics present in a very forceful manner a truth which none deplore more than those who are obliged to work constantly with this class of statistics. The difficulty to which he refers does not, however, so much lie in the imperfect character of the unit as in the fact that, up to the present, railway reports fail to separate

* Distance from Chicago to Madison on the Chicago & Northwestern Railway via the routes taken by trains—

"Nos. 3 and 5"	131 miles.
"No. 1"	138 "
"No. 7"	145 "
"No. 9"	153 "
Trains running via Milwaukee.	164 "

† Distance from Chicago to Madison on the Chicago, Milwaukee & St. Paul Railway	
Via Watertown	168 miles.
Via Whitewater	181 "
Via Rockford	186 "

‡ This is true even if one uses mileage books, as the conductors take up the same amount of mileage for the trip, whatever train one happens to travel on.

their traffic and earnings on the basis of the kinds of freight and classes of passengers carried. This has for some time been within the purpose of the Federal and the State Railroad Commissioners. Indeed, a plan for the classification of freight revenue was at one time accepted, but the late depression of railway earnings led to the postponement of its execution. It is quite possible, now that prosperity has returned, that another effort will be made to analyze receipts per ton per mile, and receipts per passenger per mile, in such a manner as to make them much more significant than they now are.

It may be doubtful if any statistician would consent to the abandonment of the ton-mileage and passenger-mileage unit, nor do I understand that such is the purpose of Dr. Swain's criticisms. This unit has received the approval of the *Institut International de Statistique*, and is adopted in the reports of all important countries with the exception of England. Progress certainly lies in the development of the unit rather than in its abandonment. The matter of international comparisons is a most difficult one. Within the past ten years there have been at least two attempts to establish uniformity in the railway statistics of Europe, but nothing very definite has been accomplished. For some reason the project fails to interest those who administer the French railways, and without France it has not been thought expedient to press the proposal. Should it be again undertaken, and the idea is by no means abandoned, the Interstate Commerce Commission has received assurances that the United States will be invited to take part in the conference. Meantime, and in the absence of any better unit of comparison, it seems wise to retain the ton-mileage unit, and to undertake its development so as to obviate the criticisms that may justly be made upon it.

It may be proper to say a word respecting the apparent discrepancy, to which Dr. Swain calls attention, between the receipts per ton per mile and per passenger per mile as reported by the Interstate Commerce Commission and as arrived at by dividing the aggregate of reported receipts by the aggregate of reported traffic.

The rule adopted by the Commission for computing averages is to exclude from the aggregates made use of all figures returned in reports that are not in all respects complete and satisfactory so far as the item under consideration is concerned. To illustrate, from the case in hand, some roads may return freight receipts but not ton-

nage; some may return freight receipts and tonnage but not ton-mileage; some may return tonnage and ton-mileage but not receipts. The averages which appear in the Statistics of Railways are computed from balanced and satisfactory returns. It is thought by this means to arrive at a statement more nearly correct than by the other method of computation. It should be added, however, that there is no considerable number of unbalanced returns.

Remarks by Arthur T. Hadley.

All careful students of railroad economy will sympathize with Prof. Swain in his protest against the abuse of ton and passenger-mile statistics. But many of them will consider that, in his zeal against their abuse, he has gone so far as to deny their legitimate use; and will stop far short of his conclusion that it is "impossible to determine from comparisons of ton-mile or passenger charges *anything whatever* in regard to differences in freight or passenger charges."

What Prof. Swain has proved thoroughly is that variations and differences on the average receipt per passenger-mile or per ton-mile are not necessarily accompanied by corresponding variations and differences in the tariff schedules of the roads concerned. What his opponents may perhaps fairly claim is (1) that, taking charges on the same road in different years, the correspondence between average rates and tariff schedules is in practise very much closer than Prof. Swain's paper would lead us to suppose; (2) that in comparisons between different roads it is possible to make abstraction of the more important disturbing elements in such a way as to guard against the abuses which Prof. Swain so justly condemns; (3) that for many purposes the average actual receipt is a more important basis of comparison than the tariff schedule.

I shall confine my discussion to the last point, which is least obvious and most important.

It is assumed in Prof. Swain's paper that if two railroads have the same tariff schedule they are charging the same rates. From one standpoint this is obviously true; from another standpoint it is, to say the least, an extremely doubtful proposition.

If one road is getting nearly all high-class freight and another is getting a great deal of low-class freight the first is actually receiving

higher average rates than the second. If one road gets all the ministers, and another gets all the commercial travellers, and a third gets all the excursionists, it is fair to say that they have different average rates for their services. The character of the business done by a railroad is not a matter of accident. It is largely dependent upon traffic management. The company that has developed low-class traffic is entitled to credit for its efforts. Of course low-class traffic is far easier to develop in some districts than in others. A man who builds a road into a region which is unfavorably constituted in this respect has his choice between two courses. He can content himself with doing high-grade business and avow that he charges high rates because his services are valuable; or he can make the extraordinary efforts needed to develop the low-grade business in his locality. In the absence of the latter alternative he must accept the former.

A road is to be judged by the business that it does, rather than by the business that it doesn't do. The ton-mileage statistic, rough as it is, has at least the merit of dealing with traffic actually handled. The tariff-schedule comparison, plausible as it seems, has the demerit of giving disproportionate weight to traffic which is *not* actually handled. The ton-mileage comparison has many sins to answer for; but this particular sin of not conforming to the tariff-schedule comparison seems often to be a virtue rather than a vice.

Remarks by Emory R. Johnson.

Statistical data used for comparison should be carefully analyzed in order to make sure that the data compared are accurate and comparable. In his paper on "Comparative Statistics of Railroad Rates" Dr. Swain has done well to call attention to the factors that affect the ton-mile and passenger-mile earnings of railroads,—the unit of most significance in the comparisons made in railway transportation statistics.

The statement made by Dr. Swain that ton-mile and passenger-mile averages are influenced by several factors is true, but is neither new nor startling. I do not know that the persons whose scientific attainments give them a right to be heard have ever claimed that "change of rates is the only thing that can cause a change in the revenue per ton-mile." Dr. Swain has indeed enumerated only a

few of the many causes influencing the ton-mile revenue of the railroads. The revenue per ton-mile depends not only upon the character of goods and upon distance travelled, but also upon the amount of goods carried, the season at which they are moved, the character of the road, whether it be a level one or one containing curves, the proportion which the traffic one way bears to that moving the other, the relation of dead weight to load, and upon many other factors well known to the practical railroad man and the student of transportation.

The criticism which Dr. Swain offers as to making comparisons of ton-mile and passenger-mile earnings of different periods, to indicate the fall which railroad charges have undergone, has some force when the comparisons made are those between the earnings for different periods of a single railway company or railroad system. It is quite possible that the character of the business done by a particular road, or the conditions under which the business is performed, may so change as to make the ton-mile and passenger-mile averages of one period the resultant of factors appreciably different from those which determine the averages of another period. It would, however, be somewhat difficult to show that any very radical change has taken place during the past ten or fifteen years in the character of the business done by such a system as the Atchison.

When, however, Dr. Swain says that "no presentation of railroad charges is at once so misleading, inaccurate, and certain to be misunderstood as a statement of the average charges per ton per mile prevailing during successive periods"; and when he declares that it is "impossible to determine, from comparisons of ton-mile or passenger-mile averages, anything whatever in regard to the differences in freight or passenger charges" he makes a statement that is not only exaggerated but inaccurate. The ton-mile and passenger-mile earnings of the railways of the United States as a whole are excellent general averages. It would be difficult to find many better general averages in statistics. There are over a thousand operating railway companies, and the kinds of goods carried number several thousands. The average earnings per ton per mile of this large number of companies engaged in the movement of this great variety of commodities presents a general average whose excellence appeals to every statistician. The Senate Finance Report on *Wholesale Prices, Wages, and Transportation* makes an essentially accurate statement when it declares

that "no presentation of the tendency towards lower charges for freight transportation by railroads is at once so comprehensive, accurate, and readily understood as a statement of the average charges per ton per mile prevailing during successive periods."

Dr. Swain's paper contains a wholesome protest against the kind of reasoning often indulged in by interested parties that have a thesis to prove regarding railway charges; but as a criticism on the utility of the ton-mile and passenger-mile earnings of the railways, as units for the measurement of the course of railway charges, much of the paper is, to say the least, misleading.

Remarks by H. T. Newcomb.

Dr. Swain's contribution to the study of railway rates is an excellent example, though graciously devoid of the spirit of malice too often noticed, of a form of criticism to which statistical work is frequently subjected, which consists principally in assuming that an unattainable object has been sought and condemning the failure to succeed in accomplishing a task that was not and should not have been attempted. Statisticians, practicing a modesty which they share with all who wish to deal with facts in a scientific manner, do not commonly assume that many problems have been "solved" by their method, and those among them who have delved in the facts which pertain to railway transportation do not assert, as Dr. Swain too boldly intimates in his opening paragraph, that absolutely accurate or entirely satisfactory comparisons among railway rates are practicable. Those who are accustomed to seek accuracy of expression, whether by means of figures or the careful choice of words, will perceive some difference between the conclusion that: "It is therefore impossible to determine, from comparisons of ton-mile or passenger-mile averages, anything whatever in regard to the differences in freight or passenger charges," and the "not difficult" demonstration which consists in showing that such averages are somewhat affected by variations in factors other than rates that results from the preceding effort "to show that no presentation of railway charges is at once so misleading, inaccurate, and certain to be misunderstood as a statement of the average charges per ton per mile prevailing during successive periods."

The real question is not whether there are such variations, but whether they are sufficient materially to affect the averages. It may

be perfectly true, as stated by Mr. McCain in the report of the Committee on Finance of the Senate on *Wages and Prices*, that: "No presentation of the tendency toward lower charges for freight transportation by railways is at once so comprehensive, accurate, and readily understood as a statement of the average charges per ton-mile prevailing during successive periods," even though there is a possible margin of error in such a statement due to several causes including those noticed by Dr. Swain. No fact in statistics is more commonly recognized than that the death rate of a particular community is in some degree affected by the age distribution of those composing it, yet statisticians do not believe that comparisons among crude death rates fail to throw some light upon the relative healthfulness of different communities. The variations in the factors which independently of changes in rates may effect variations in the averages per ton-mile probably affect the latter even less than death rates are affected by variations in age distribution. They might modify the average "most profoundly," but in practice they do not, and the propriety of attributing to variations in rates, the fluctuations in ton-mile averages, so far as to claim that the latter throw valuable light on the former, is far less a question of logic than one of fact.

The comparative unimportance of the variations in ton-mile averages which result from fluctuations in the relative quantities of freight in the different classes may be shown by applying actual rates and distances to the figures showing the percentage of tonnage in each class during 1889 and 1892 quoted from the report of the Committee on Finance in a foot-note to Dr. Swain's paper as follows:—

Class.	Per cent of tonnage.		Rates. New York to Buffalo. per 100 pounds.	Per cent of tonnage multiplied by rate.	
	1889.	1892.		1889.	1892.
1	22.2	19.9	30	665.8	776.1
2	6.9	5.4	33	227.7	178.2
3	12.8	11.3	28	358.4	316.4
4	13.0	10.4	19	247.0	197.6
5	7.8	9.6	16	124.8	153.6
6	37.3	43.4	13	484.9	564.2
	100.0	100.0		2,308.6	2,166.1

According to the foregoing the average rate per ton of freight from New York to the Trunk Line termini was \$4.62 in 1889 and \$4.37 in 1892, and the average rate per ton per mile on the basis of the distance between New York and Buffalo was 1.049 cents in the former and 0.994 cent in the latter year. Though the difference of one-half of a mill would scarcely vitiate the comparison even if the result of causes entirely independent of fluctuations in rates, it is not, as Dr. Swain has rather hastily assumed, the consequence of changes in the character of shipments, for the increased percentages in the lower classes in 1892 were caused by modifications in the classification of freight which, between 1889 and 1892, had transferred many articles to the lower classes. This was fully explained in the report together with the fact that changes in classification result in actual changes in rates.

The other sources of error indicated are not more important. In accordance with the same law which determines that in an extensive community there will be during equal periods approximately the same number of murders and suicides, the passengers of the country purchase during different years about the same relative proportions of the different classes of tickets, and shippers forward different commodities in quantities varying, with regard to each other, even less. It is to be observed that the article does not cite a single fact which tends to establish the relative probability of changes in the averages being due to the several causes which affect them.

All those who have studied the subject are aware of the conditions which limit the rate per ton-mile and passenger-mile averages and wish to see the classification of railway statistics extended until it will be possible to give such averages separately for different classes of traffic. It is desirable, for example, to have the average rate per passenger mile for passengers travelling on each of the great classes of tickets. Both passengers and freight should also be classified as local or through traffic, according to their general direction and according to the distance traversed. Before these data can be secured, however, there must be a considerable development of railway accounting, and in the mean time statisticians will be obliged, as they are in connection with many other problems, to be satisfied with the best results that can be obtained under limiting conditions which they recognize and regret.

It should be remarked that the criticism of the report of the Statistician to the Interstate Commerce Commission, implied by the foot-notes calling attention to the differences between the average rates per passenger and per ton per mile reported, and the actual quotients obtained by dividing passenger revenue by passenger-miles and freight revenue by ton-miles, is not well founded. The reports on Railway Statistics very properly give the aggregate of revenue and of passenger and freight mileage for all railways which report any of those items, but before obtaining the averages it is always necessary to deduct the revenue of roads which do not report their passenger or freight mileage.

Remarks by C. E. Prevey.

In this article two problems appear to be involved: First, the mathematical question which lies on the surface, whether or no a decline in the average receipts per ton or passenger-mile necessarily implies a reduction of rates; and, second, an ethical question regarding the fairness of rates, which is implied in the treatment of the subject. Considering first the mathematical question, we cannot agree with the writer of the article in giving a negative answer. We should answer the question as just stated in the affirmative, and for the following reason: By a reduction in rates we can mean nothing else than average rates. We cannot mean individual rates for the shipment of a given class of goods over a given piece of road, because these are too numerous and too fluctuating to be compared, and the only thing that can be compared is the *average* amount received for the shipment of a ton of freight one mile, which is found by dividing the total freight receipts by the number of tons carried one mile. This average amount may be lowered by the reduction of tariff rates or by an increase in the relative amount of low-class freight shipped, the schedules remaining the same. The latter is as truly a reduction in average freight rates as the former.

The writer gives a number of examples showing how the average rate may be lowered while the schedule of rates or tariff remains the same. Perhaps the following table will help to make clear the relation of these factors: —

FREIGHT TRAFFIC.

Causing low rates...	1. Long Distances	2. Large Shipments	3. Low Value of Goods	4. Competition
Causing high rates..	Short Distances	Small Shipments	High Value of Goods	Lack of Com- petition

PASSENGER TRAFFIC.

Causing low rates...	1. Low Class Service	2. Long Distances	3. Suburban Traffic, Special Rates, etc.	4. Competition
Causing high rates..	High Class Service	Short Distances	.....	Lack of Com- petition

Under the column of freight traffic are shown four of the principal qualifications which tend to give a low-freight rate to any particular shipment of goods, and their opposites which tend to give a high rate. The value of the goods by weight is the chief factor determining the "classification," and second in importance is the size of the particular shipment.

The less the value and the larger the amount shipped, other things being equal, the lower will be the class. Thus coal will be in a lower class than coffee, and either will be classed lower in car-load lots than in smaller quantities. Then the longer the distance and the more competition the less will be the rate per ton-mile for any given "class" over any given piece of road. A similar explanation applies to the column under passenger traffic.

The article shows in an interesting manner, by a number of concrete examples, how a change in the character of the traffic in the direction indicated in the upper row in the diagram may lower the average rates, viz., in passenger traffic a larger percentage of low-class service (2nd and 3rd class, limited tickets, etc.), more long-distance travel, more suburban traffic or more traffic between competitive points; and in freight traffic a larger percentage of cheap goods, more car-load shipments, more long-distance consignments, and more traffic between competitive points.

This does not affect the mathematical question which we have stated, but it does have a practical bearing on the more important ethical question, which is this: Has the reduction in average rates per ton-mile been at the expense of the railroad companies and a

direct gain to the public, or does it consist merely in doing less work for less money? Does the average ton-mile represent a smaller service now than it did when rates were higher? The answer to this question requires an analysis of the items tending toward lower rates as illustrated in the upper part of the diagram.

Let us assume that the tariffs have remained exactly the same, and that the reduced average receipts per ton-mile are due to a change in the nature of the traffic,—then the answer to our second question depends on which of the four factors (under freight traffic) has been instrumental in reducing the revenue. If it be due to either (1) or (2),—larger shipments or longer distances,—it means that the cost of service is less, and the reduced rate is no loss to the railroad and no gain to the public. But if the reduced revenue is due to the transportation of more low-priced goods or more traffic between competitive points it is *not* accompanied by a diminished cost to the railroads, and is a gain to the customers. The higher rates previously charged, when the freight was valuable and competition absent, were high, not on account of a large expense of handling, but because, under the principle of charging what the traffic will bear, those goods were found to be able to bear a high charge. Now under the changed character of traffic no such relatively large quantity of freight is found which will bear such charges, and so the average has been lowered. Likewise in the case of passenger traffic, if the reduction is due to a larger proportion of low-class service or of long journeys it means a less expensive service, and is no gain to the public; but if it is due to more travel between places having low rates on account of competition or more suburban traffic it means a cutting down of the monopoly profits of the railroads, and is a gain to the public.

Now the examples given in Mr. Swain's paper show that the reduction in average rates has been due to the operation of both causes,—those which reduce the cost, and those which reduce the monopolistic power of the railroads. Just how much it is due to each, and how far it is a direct benefit to the customers, it would be difficult to determine. One fact which lies on the surface is that the low average freight rates per ton-mile in this country are due chiefly to the enormous amount of long distance freight traffic.

**COMPARATIVE STATISTICS OF RAILROAD SERVICE
UNDER DIFFERENT KINDS OF CONTROL.****BY C. E. PREVEY.**

From the standpoint of the consumer of railroad services the intrinsic merits of any railroad system are measured by the quantity and quality of the service rendered and by the price. Both quantity and quality of service and price are influenced by the character of the government control over the railroads. It is the purpose of this paper to present some of the leading facts regarding quantity and quality of service rendered by railroads under different systems of railroad control.

Among the items under the head of railroad service are the following: Frequency, speed and regularity of trains, safety, furniture, and equipment of cars; rules as to carrying baggage, conveniences of making connections, station equipment, and courtesies of officials. Only the first two of these can be studied statistically. This paper will be confined chiefly to the first item,— frequency of trains.

In comparing the efficiency of different systems of railroad control in different countries, it must be remembered that there are many other circumstances which affect the character of the service and prices besides the method of control. No decision as to the merits of government or private ownership can be drawn off-hand from a comparison of services and rates in different countries. The density of population, topography, geographical location, natural distribution of products, and, most of all, the state of civilization of the people have more to do with the development of railroading than the particular system of control adopted.

There are a number of methods of comparing railroad development which do not distinguish between quantity and quality of service: First by a comparison of the ratio of

railroad mileage to area or to population. These two kinds of comparisons give widely different results and are faulty, because the former makes too favorable a showing for the small and densely populated countries, while the latter favors the large and sparsely populated countries.

Another method of comparing railroad services is the "density of traffic" measure. By this is meant the average number of passengers and tons of goods transported over each mile of railroad. The first difficulty with this comparison is that it takes no account of the extent of the railroad system. A country like India may have only a few miles of road connecting the most populous centers which will show a great density of traffic and yet the country at large be very poorly supplied with railroad facilities. In addition to the above objections to these methods of comparison there is the further objection that none of them make any account of quality of service. The patrons of the road may be accommodated by any number, more or less, of trains per annum and yet it will make no difference in the figures.

Another proposed means of comparison is by frequency of trains, which is found by dividing the whole number of miles run by trains in a year by the miles of road. This has the advantage of exhibiting the quality of service,—the more frequent the trains the greater the accommodations to the patrons of the road. It is lacking, however, in that it shows nothing about the *extent* of railroad service, or how far it meets the wants of the people as a whole.

As opposed to all these methods of comparison there is still another which does take into account to some extent the quality and quantity of service relative to the whole population. This is the train mileage per capita basis of comparison. In the denominator of the fraction, $\frac{\text{train-mileage}}{\text{population}}$ the interests of the whole people are represented. In the numerator quality and quantity are both represented in a rough way, since the mileage depends on length of road and frequency

of trains. At the same time some allowance is made for density of population because the average distances will be greater in the thinly populated countries.

In Table I is shown the train mileage per 1000 inhabitants for each of the leading countries of the world for the latest dates obtainable. The countries are arranged in three groups according to the kind of control. The railroads in the first group of countries are all owned and operated by private companies with the exception of a small part of the roads in Canada.

TABLE I.—ANNUAL TRAIN MILEAGE PER 1,000 INHABITANTS.

State.	Year.	Train Mileage per 1,000 Popu- lation.	Miles Under Control of State.	Private.
I.	United States....	1895-96	11,961	180,891
	Great Britain....	1895	8,815	21,174
	Canada.....	1895	8,134	14,631
	France.....	1894	4,776	22,833
	Italy.....	1890	1,237	2,895
	Switzerland....	1894	4,860	2,220
	Hungary.....	1895	3,211	1,463
	Sweden.....	1895	1,262	3,603
	Holland.....	1894	4,040	.....
II.	India.....	1894	227	.....
	"	State owns and operates.....		5,198
	"	State railroads worked by companies.....		8,605
	"	Private roads.....		4,697
III.	Germany	1895-96	4,328	25,205
	Belgium.....	1895	5,348	2,061
	Russia.....	1894	876	11,131
	Norway.....	1895-96	1,554	980
	Australia.....	1895-96	7,680	9,754
			

Statistics of population from the *Statesman's Year Book*; also statistics of railroad mileage in a few cases. Statistics of train mileage in this and the two following tables are from the *Archiv für Eisenbahnwesen*. Following are the citations to year and page: Great Britain, '97, 1126; Germany, '97, 1126; France, '96, 1126; Italy, '94, 894; Switzerland, '97, 84; Sweden, '97, 502; Holland, '96, 417; Belgium, '97, 1168; Russia, '97, 779; Norway, '97, 500; Hungary, '97, 945; India, '96, 779; Australia, '97, 1184; Canada, '97, 525; United States, *Poor's Manual*, '97; Austria, '97, 73.

The countries in the second group have a mixed system of government and private control. In France the government owns 1608 miles and the companies 22,833 miles, but the private roads are under a minute supervision by the government. In Italy part of the roads are owned by the state and part by private companies, but those owned by the state are leased and worked by the companies. In Switzerland the roads are owned and worked by private companies, but under the strict supervision of the government. In Sweden two-thirds of the mileage is under private control and one-third is owned by the state. In Holland the roads are chiefly owned by the state and rented out to private companies. In India both systems of railroad control exist.

In the third group of countries nearly all the railways are owned and operated by the state. In Russia about one-third* of the railroads are in the hands of companies, but the government owns a large part of the stocks.

A glance at this table shows that those countries whose roads are owned and operated by private enterprise have by far the largest train-mileage per capita. In the United States a train is run on the average 11.9 miles annually for each inhabitant. In England the number is 8.8 and in Canada 8.1 miles, while no continental European country has a train-mileage as high as five miles per capita, except Belgium, which has 5.84.

Table II shows the passenger and freight train-mileage per thousand inhabitants for the same years as given above.

The train mileage per capita is the best measure of comparative *railroad development* in different countries. That railroad development is dependent on many things besides the system of control is evident. The question arises whether there is any set of statistics of railroad services which eliminate the results of natural conditions and indicate more nearly the direct affects of the system of control.

* The companies owned in 1894, 9472 miles, and the state 11,131 ; but at the beginning of 1896 the state owned 16,126 and the companies 8464 miles.

TABLE II.—ANNUAL TRAIN MILEAGE PER 1,000 INHABITANTS.
(Same dates as in Table I.)

	Passenger.*	Freight.
United States.....	4,755	7,008
Great Britain.....	4,733	3,843
France.....	2,354	1,623
Germany.....	2,285	1,580
Switzerland (including mixed).....	3,751	1,757
Belgium.....	3,054	2,145

It is suggested that some approximation toward this can be made by a double comparison, *viz.*, of the density of traffic and of the frequency of trains. The reasons and the method of such a comparison are as follows:—

The efficiency of any system is measured by the quality and price of the service and the supply of services rendered relatively to the potential demand. The potential demand is measured not by the amount of the population, but by the amount of use that would be made of railroad facilities if they were offered. Now, as we have seen, the first railroads in any country connecting the principal traffic points meet a very strong demand for railroad services, and the density of traffic is very great. As the railroad is extended the demand for services “on the margin” grows less and less, and the average density of traffic diminishes. Therefore the average density of traffic is an approximate measure of how nearly the extension of railroad facilities has approached to the existing demand for railroad services. The more the railroad system is extended, other things remaining equal, the lower will be the density of traffic. The demand for

* No account is here made of the mileage of mixed trains because complete statistics are not to be had. The proportion of mixed trains is larger in Continental Europe than in England or the United States, as shown by the following figures taken for the same dates and from the same source as the above:—

	Passenger Train Mileage.	Mixed Train Mileage.
United States	337,641,115	15,785,433
England	184,064,400	4,284,490
Germany	119,666,700	20,865,600
France	90,417,600	29,249,100

railroad services is very largely the result of natural conditions, state of civilization, etc. The supply of railroad services is very largely the result of the system of railroad control. It should be remembered, however, that the demand (as expressed in density of traffic) is very largely affected by railroad rates. Therefore, in comparing the density of traffic in different countries to determine how far the railroad system has met the demand, it is necessary to take into account the rates. Thus, in comparing the United States with India as to passenger traffic, we can not say that American railroads have necessarily come more nearly to the demands for travelling facilities on the grounds that the density of passenger traffic is greater in India. Our fares are very much higher than the fares in India, and we do not know what the density of passenger traffic would be in this country if fares were put down to the Indian tariff, nor what the density of passenger traffic in India would be if their fares were raised to the level of ours.

We can summarize the foregoing by saying that the efficiency of a railroad system in respect to quantity of service (relative to demand) is measured by the reciprocal of the average density of traffic. The quality of service is measured by the frequency of trains. These two quantities taken together are the measure of comparative service. The equation,

$$\text{Frequency of trains} + \frac{1}{\text{density of traffic}} = \text{price,}$$

expresses the fact that, other things being equal, price should vary with frequency of trains and inversely with density of traffic.

Tables III and IV exhibit the density of traffic and frequency of trains of the important states. No statistics of density of traffic are kept in England, and we have not the figures for Canada, so that the only private owned roads with which we can compare are those of the United States.

TABLE III.—FREQUENCY OF TRAINS.
Average number of train-miles per mile of road.

	Total.	Passenger.*	Freight.
United States, 1896.....	4,702	1,867	2,750
Great Britain, 1896.....	16,006	8,700	7,108
Germany, 1896.....	8,097	4,244	2,913
France, 1893.....	7,608	3,756	2,590
Austria, 1895.....	5,219	(State roads only.)	.....
Hungary, 1895.....	5,698	.....	.....
Switzerland, 1894.....	6,451	(4,941 including mixed.)	1,510
Norway, 1896.....	2,905	.....	.....
Sweden, 1895.....	3,062	.....	.....
Russia, 1894.....	5,271	.....	.....
India, 1894.....	3,480	1,370	2,035
Australia, 1895-96.....	.....	.....	.....
New South Wales.....	3,050	1,465	1,590
Victoria.....	2,881	.....	.....
Queensland.....	1,998	.....	.....
S. Australia.....	2,004	791	.....

TABLE IV.—DENSITY OF TRAFFIC.
Number of ton-miles or passenger-miles per mile of line. (One ton = 2,000 pounds.)

	Passenger.	Freight.
United States.....	72,150	519,290
Great Britain.....	(No statistics.)	(No statistics.)
France.....	261,182	350,000
Germany.....	315,399	616,474
Switzerland.....	239,408	196,508
Sweden.....	76,482	150,932
Russia.....	189,600	706,689
Norway.....	91,552	68,859
Belgium.....	496,000	(State roads only.)
Austria.....	217,746	414,002
Hungary.....	143,000	348,700
India.....	315,085	232,000
New South Wales.....	41,200	.....

Comparing the United States with India as to density of traffic we find that in passenger service in the United States there are 72,150 passengers carried over each mile of road annually, while in India the number is 315,000. Ignor-

* See footnote, p. 127.

ing the effect of the difference in rates this would indicate that in India roads have not been extended to places contributing small traffic to anything like the extent that they have in the United States. On the other hand, trains are run more frequently in the United States than in India. The number of passenger trains running over each mile of road was 1867 in the United States, and 1870 in India. Thus we conclude that, as far as passenger traffic is concerned, both the quantity and quality of service in India is far inferior that of the United States. Rates ought to be cheaper there than here, because trains run less frequently and the amount of traffic is greater, so that while in the United States the average number of passengers in a train is 35 in India it is 224 (see Table V). Comparing the United States and France, we find that for a given section of road France

TABLE V.—AVERAGE TRAIN LOADS.

	Passenger-Miles Per Passenger Train Mile.*	Ton-Miles Per Freight Train Mile.
United States.....	35	180
Germany.....	73	190
France.....	69	130
Switzerland.....	48	(Mixed train mileage included.)
Belgium.....	66	....
India.....	224	142
New South Wales.....	26	....

* See footnote, p. 137.

has over three times as many passengers to carry, and that passenger trains run about twice as often.* This shows better service in France on the lines operated. If we estimate the *extent* of service in proportion to demand by density of traffic we find that the density of passenger traffic is about three times as great in France as in the United States, while freight traffic is only three-fifths as great as in

* No account is made of mixed trains. In France the mileage of mixed trains is one-third of that of passenger trains, while in the United States it is about one-twenty-second.

the United States. This disparity between the density of freight traffic and passenger traffic makes it difficult to give the United States any definite rank from the stand-point of intensity of traffic. The passenger traffic of the United States is less dense than that of any European country, while the freight traffic is more dense than that of any country except Germany and Russia.

While this method of comparing quality of service will not enable us to establish definitely the relative quality of railway service in different countries it helps to correct some wrong impressions which result from a comparison of train-mileage per capita. Thus it is said that railroad fares are higher in this country than in Europe, partly because trains run oftener here than in Europe and carry smaller loads, whereas the statistics show that our passenger trains run less frequently than those of Europe. In the United States the annual number of passenger-train miles per mile of road is 1867; in England, 8700; in France, 8756; Switzerland, 4941; Germany, 4244; Belgium, 7215. It can not be maintained, therefore, that our train service is better than the European, unless it be on the grounds that European railroad systems are not so extensive as ours,—that they do not supply railroad facilities to so large a part of the population in remote districts where traffic would be small.

How far this is true is partly indicated, we think, by the table of density of traffic. All the European countries, except Germany and Russia, have a lighter freight traffic than the United States, which would indicate that their railroad systems were more extended in proportion to demand than ours. On the other hand, all the countries of Europe have a heavier passenger traffic than the United States. That the latter fact is due in large part to the lower fares in Europe is shown by the fact that in Hungary, when the zone tariff system was established a few years ago with a reduction in fares of from 40 per cent to 50 per cent, the number of passengers carried trebled the first year.* Even before the reduction in rates their fares were much lower than ours. It seems probable

* *Review of Reviews*, vol. v, p. 582.

that if fares in Europe were as high as in America the density of traffic would not be much greater.

In order to compare the train service of European railroads with that of roads under private ownership having equal density of traffic we have constructed Table VI. In this the states of the Union are divided into eight groups, and the table shows for each group of states the density of population, the density of passenger traffic, the per capita train-mileage, the number of miles run by passenger and freight trains per mile of road (frequency of trains), and the average train loads.

TABLE VI.—RAILROAD TRAFFIC IN THE UNITED STATES.

Group.	Passenger and Freight-Train Mileage per 1,000 Population.	Passenger-Train Mileage per Mile of Road.	Freight-Train Mileage per Mile of Road.	Passenger and Freight-Train Mileage per Mile of Road.	Passenger-Mileage per Mile (in 1,000).	Ton-Mileage per Mile.	Passenger-Train Load.	Freight-Train Load.
1	10,410	4,113	3,150	7,263	253 —	476 —	61	151
2	15,044	4,100	6,690	10,790	170 —	1,410 —	41	210
3	16,100	1,890	2,880	4,760	64.4	545	34	188
4	7,180	1,220	1,700	2,920	39	330	33	193
5	4,497	1,490	2,240	3,720	49.6	391	33	175
6	8,911	1,160	1,770	2,920	34	263	29	138
7	9,320	920	1,550	2,470	29.5	323	32	207
8	9,740	1,130	1,430	2,560	62.1	269	55	187
Mass	17,520	11,357	8,000	19,357	769.0	1,036	63	129

States in Each Group.	Density of Population.
1. Maine, N. H., Vt., Mass., R. I., Conn.,	80
2. N. Y., N. J., Penn., Del., Md.,	137
3. Ohio, Mich., Ind., Ill., Wis.,	65
4. Va., W. Va., N. C., S. C., Ga., Fla.,	78
5. Ala., Miss., Tenn., Kentucky, La.,	44
6. Mo., Ark., Texas, Kansas, Col., N. Mexico, Okla.,	14
7. Iowa, Minn., Neb., N. Dakota, S. Dakota, Wyoming, Montana,	9
8. Wash., Oregon, Cal., Nevada, Arizona, Idaho, Utah,	4
Massachusetts,	315

Railroad statistics from *Poor's Manual*, 1897. Population from *World Almanac*, 1897, p. 515.

We get, now, some very interesting results by comparing the different countries of Europe with that portion of the United States which most nearly resembles it in density of population and density of railroad traffic. Thus we will compare New England with Germany, France, Austria, and Switzerland:—

	Area.	Density of Population.	Density of Passenger Traffic.	Density of Freight Traffic.	Passenger- Train Mileage Per Mile.	Average Passenger Load.
New England.....	33,040	80	253	476	4113	61
Germany	211,108	201	515	616	4244	72
France.....	204,177	182	261	350	3756	60
Austria (state roads).....	..	..	217	414	(5219 total)	..
Switzerland.....	15,981	181	239	195	(4941 includ- ing mixed)	48

(The figures under the heading "Density of Passenger Traffic" represent the number of thousands of passenger miles per mile of road. The figures in the next column show the number of thousands of ton-miles per mile of road.)

In Germany the density of passenger traffic is only one-fourth greater than in New England, and the freight traffic is 29 per cent greater. The frequency of passenger trains is a little greater in Germany than in New England. In France the density of passenger traffic is greater than in New England, the freight traffic is 64 per cent as great, and the frequency of passenger trains 92 per cent as great. So far we have not taken into account the mixed trains, because the mileage of mixed trains is not given for the separate states of the Union, nor for all the European countries. We find, however, that for the United States the mixed-train mileage is only about one-twenty-second of the passenger-train mileage, while in France it is one-third, and in Germany one-sixth of the passenger-train mileage. After making proper allowance for mixed trains we would find that the frequency of trains carrying passengers is greater in Germany and France than in New England.

In Austria the number of passenger-train miles is not given separately, but we may estimate them to be about three-fourths as many as in New England, and considering that the traffic is considerably lighter we see that even Austria is much better supplied with railroad facilities than is commonly supposed. Switzerland we find with a considerably lighter traffic, has a considerably larger number of passenger and mixed trains, and a much smaller average load.

Again, let us compare Hungary with the north middle states: —

	Density of Population.	Density of Passenger Traffic.	Density of Freight Traffic.	Passenger-Train Mileage Per Mile.
States.....	187	170	1410	4100
Hungary.....	187	148	348	(3000, estimated)

(The total train mileage per mile in Hungary is 5698, and we estimate the passenger mileage at about 8000 miles.)

In round numbers, Hungary, with a passenger traffic seven-eighths as dense, and a freight traffic one-fourth as dense, has about three-fourths as many passenger trains per mile per annum as has the great trunk line region of this country.

For a comparison of regions with lighter traffic we take Norway and Sweden and compare them with the United States west of the Rocky Mountains (Washington, Oregon, California, Nevada, Arizona, Idaho, and Utah): —

	Density of Population.	Density of Passenger Traffic.	Density of Freight Traffic.	Passenger-Train Mileage Per Mile.
States.....	4	63	269	1130
Norway.....	14	91	68	(total, 2800)
Sweden.....	27	76	150	(total, 3062)

Norway and Sweden have a heavier passenger traffic than the western states, but their passenger trains run oftener also. The total number of train miles per mile of road per annum is 2890 in Norway and 3062 in Sweden, and the number of passenger-train miles probably more than half of these figures, as compared with 1130 in the western states.

New South Wales has a density of passenger traffic of 41,200,—a little less than that of the southern states: Alabama, Louisiana, Mississippi, Tennessee, Kentucky, and passenger trains run with about the same frequency, the passenger-train mileage per mile being 1465 in New South Wales, and 1480 in the southern states.

If these comparisons are worth anything they show that European railroads, being chiefly under government ownership and charging much lower passenger rates, have supplied the demands for railroad facilities about as well as have the railroads of the United States. In frequency of trains they are seldom behind and usually ahead of American railways. High fares in the United States cannot be justified on the score of frequency of trains or size of train loads.

REVIEWS AND MISCELLANY.

DIVORCES GRANTED IN MICHIGAN DURING THE YEAR 1897.

A law passed by the legislature of 1897 requires county clerks to make a return to the Secretary of State of all divorces. This law took effect on August 29, 1897, but the returns, which were made for the first time in January, 1898, were for the entire calendar year, 1897. Each divorce is returned individually much in the same manner as a record of marriage, the following items being stated: Full name of each party; age of each in years; date of marriage; place of marriage; number of children in family; complainant; date of filing application; date of final action; alleged cause for divorce; whether contested; whether granted, refused, withdrawn, otherwise disposed of, or pending at end of year; conditions, if any. Besides the individual return on the schedule, the county clerk makes a summary, stating the total number pending at the beginning of the year; number of suits begun; divorces granted, refused, etc. It was found that these summaries were carelessly made in some cases, so that for the first year a compilation was based entirely upon the individual records of divorces granted, to which all of the figures given below refer.

It may be stated that not all divorces granted by the courts are properly entered on the records as such. The reason is that a small fee is required by the clerks of the courts for the final entry, and this is not always properly paid, either by the parties themselves or by their attorneys. As a result individuals may suppose themselves divorced and remarry, while the court records contain no record of the decree. This imperfection is probably not very great, and affects the data obtained by the United States Commissioner of Labor for Michigan some years ago. It is chiefly important to remember that the numbers given in the following tables are rather under the true figures.

The total number of divorces reported for the year 1897 was 1656. Of this number 428 were granted on the application of the husband,

and 1233 on application of the wife. Classified by place of marriage: 1360 of the marriages dissolved were performed in Michigan, 65 in the adjacent states of Ohio, Indiana, and Wisconsin, 101 in other states of the Union, 86 in Canada, 22 in other foreign countries, and 22 in unstated locality.

The total number of children affected by the divorce of their parents during the year was 1833, or a little more than one child to each divorce on the average. The distribution of children to divorced couples was as follows:—

	Total.	Number of Children in Family.													Unk.
		0	1	2	3	4	5	6	7	8	9	10	11	12	
Divorces granted	1656	771	407	199	127	52	35	16	13	2	2	2	1	1	28

The average duration of marriage until the granting of a divorce was 10.7 years. The distribution by five-year periods was as follows:—

	Total.	Duration of Marriage in Years.											Unk.
		Under 5 Years.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49		
Divorces granted.	1656	472	464	301	177	115	61	25	21	5	1	14	

The principal causes alleged in the applications for divorces are cruelty, desertion, non-support, drunkenness, adultery, and imprisonment. Frequently two or three of these causes are stated in combination, so that in the following table a statement is given of the total number of suits into which each cause entered as a factor, the total number granted for each cause as the sole reason, and some of the principal combinations under each head:—

ALLEGED CAUSES.	NUMBER OF DIVORCES GRANTED.		
	Total.	Husband.	Wife.
All causes.....	1,656	423	1,233
CRUELTY.....	849	177	672
Cruelty.....	560	155	405
Cruelty and non-support.....	184	....	184
Cruelty and desertion.....	40	17	23
Cruelty and drunkenness.....	25	1	24
Cruelty and other causes.....	40	4	36
DESERTION.....	533	323	309
Desertion.....	405	203	202
Desertion and non-support.....	67	....	67
Desertion and cruelty.....	40	17	23
Desertion and other causes.....	20	3	17
NON-SUPPORT.....	513	....	513
Non-support.....	211	....	211
Non-support and cruelty.....	184	....	184
Non-support and desertion.....	67	....	67
Non-support and other causes.....	50	....	50
DRUNKENNESS.....	104	5	99
Drunkenness.....	39	4	35
Drunkenness and cruelty.....	25	1	24
Drunkenness and other causes.....	40	..	40
ADULTERY.....	63	43	19
Adultery.....	49	36	13
Adultery and other causes.....	13	7	6
IMPRISONMENT.....	11	....	11
Imprisonment.....	5	....	5
Imprisonment and other causes.....	6	....	6
Other and unknown.....	3	...	3

It will be seen that over one-half (51.3 per cent) of all divorces granted contain the allegation of "cruelty" as a factor, while about one-third of all the cases are granted on this allegation alone. About one-third of the total number of divorces involve desertion; these constitute a larger proportion (52.7 per cent) of the suits of husbands than of wives (25.1 per cent). Next to cruelty, non-support is the most frequent cause of divorces granted to wives (41.5 per cent). No divorces are granted to husbands for this cause. Drunkenness enters as a factor into 6.3 per cent of all cases, while adultery is alleged in 3.7 per cent. In the latter case, for obvious reasons, the statistics may be below the truth.

The above data are presented as a preliminary study of the results of the first year's registration of divorces in Michigan. A more complete analysis will be presented in the *Michigan Registration Report* now in press. There is certainly room for hope, when the system shall have become thoroughly established and the reporting officers have attained greater familiarity with the duties required, that some very valuable results will be obtained.

CRESSY L. WILBUR.

Division of Vital Statistics,
Department of State,
Lansing, Michigan, July 25, 1898.

CLASSIFICATION OF CAUSES OF DEATH.

The following circular letter has been sent by a committee of the American Public Health Association to registration offices of foreign countries, and to all state and municipal registration offices, boards of health, medical, pathological, statistical, actuarial, and other societies, and individuals making use of mortality statistics in the United States:—

The American Public Health Association at its meeting at Ottawa on September 28 to 30, 1898, recommended the adoption of the Bertillon classification of causes of death, a system reported to the International Statistical Institute at the session held at Chicago, 1893. The Conference of State and Provincial Boards of Health of North America also recommended the adoption of this system at the meeting held at Detroit, August 10 to 11, 1898.

Provision is necessary in adopting a system of classification of causes of death for regular periodical revisions in order to maintain it abreast of the advances of medical science. A plan for such revision has received the approval of the American Public Health Association, embracing the countries of Canada, Mexico, and the United States, and has also been accepted by the statistical service of France. This plan provides for the completion of the revision, with the coöperation of all countries using this system, by the year 1900, and its promulgation in connection with the session of the International Congress of Hygiene and Demography to be held at Paris

in that year. This will enable the mortality statistics of the next century to be begun on a uniform basis.

It is desired that as many countries as possible signify their intention to make use of this international system, and take an active part in the work of revision. The conduct of the work in each country will be vested in a representative commission of three members, one of whom will act as the National Secretary.

In connection with this work of revision the Committee of the American Public Health Association on Demography and Statistics in their Sanitary Relations is preparing a pamphlet showing the present form of the Bertillion system. This list is to be used as a basis of reference in suggesting changes from the present form.

The members of the commission for the three countries represented in the American Public Health Association have been appointed by the President of the Association with the approval of the Executive Committee as follows: —

Dr. Emmanuel P. Lachapelle, Montreal, P. Q.	}	CANADA.
Dr. Peter H. Bryce, Toronto, Ont.		
Dr. Elzéar Pelletier, <i>Secretary</i> , Montreal, P. Q.		
Dr. Eduardo Licéaga, Mexico, Mexico.	}	MEXICO.
Dr. Jesus E. Monjarás, San Luis Potosi, Mexico.		
Dr. Jose Ramirez, <i>Secretary</i> , Mexico, Mexico.		
Dr. Samuel W. Abbott, Boston, Mass.	}	U. S.
Dr. A. G. Young, Augusta, Me.		
Dr. Cressy L. Wilbur, <i>Secretary</i> , Lansing, Mich.		

The Commissioners for the United States request the coöperation of all societies and individuals interested in obtaining uniform and thoroughly comparable mortality statistics, and especially desire suggestions as to needed changes in the classification. It is urged that all who may be willing to assist in the work to notify the Commission at as earlier a date as possible, so that their names can be registered and all necessary information can be sent to them. Medical journals are requested to bring this announcement to the attention of the profession, and secretaries of societies are likewise asked to present the same to their organizations.

A pamphlet containing the official version of the classification, and showing the inclusion of terms, will be ready for distribution about January 1, 1899, and will be sent to all who may signify their desire to aid in the work of revision. A few copies of the classification as

adopted in Michigan, showing the general arrangement of the system but not the details of inclusion, are still on hand, and will be sent as long as they last to those who desire them. They will serve to convey a general idea of the plan of classification. Correspondence is solicited with all interested in the preparation of a thoroughly satisfactory classification of causes of death, and the amendments and suggestions of registrars and statisticians in other countries, even those continuing to use different systems of classification, are desired. If correspondents will kindly suggest names of persons or societies who would probably take part in this work, the favor will be appreciated. Marked copies of any publications referring to the work of revision are requested.

It is requested that all communications be sent to Cressy L. Wilbur, M.D., Secretary U. S. Commission, Lansing, Michigan.

BIRTH RATE IN ENGLAND.

Is the Birth-rate Still Falling? By R. H. Hooker, M.A. In *Manchester Statistical Society Transactions*. Session 1897-98. Pp. 101-126.

Eminent authorities have maintained within the last ten years that the birth rate in Europe and in the United States is rapidly declining. This view, however, has recently been questioned. Mr. Hooker contends that it is not tenable so far as the birth rate of England is concerned. He endeavors to show, first, that the marriage rate, after remaining at a stationary average level until the early seventies, fell abruptly between the years 1873 and 1879, and that it has since remained stationary; and, secondly, that the present steadiness in the marriage rate points to a cessation in the decline of the birth rate. By birth rate and marriage rate Mr. Hooker means throughout the number of births and marriages per 1000 of the total population.

A comparison of the expert curve and marriage rate shows that until 1876 the two rose and fell together, but that from 1877-79 the rate fell abruptly, while the expert curve, after falling sharply from 1873-76, "shows a decidedly slackened downward movement, the natural consequence of which should be a slackening of the fall in the

marriage rate during the years 1877-79, if we assume a close connection between the two." After 1879 the marriage rate again rises and falls, though at a lower level, with fluctuations in trade prosperity, and manifests no further tendency to decline. A curve for the marriage rate corrected on the hypothesis of a fall of 1.7 per 1000 in the three years 1877-79 agrees much more closely with the expert curve than does the one constructed by Dr. Ogle on the hypothesis of a continuous fall, and continues to agree with it, which Dr. Ogle's, if extended to the present time, does not. The change in the marriage rate should therefore be attributed, not to a continuous decline, but to a sudden drop during the years 1877-79.

The decrease in the marriage rate may be accounted for by an increase in the number of persons who defer marriage. But in order that the marriage rate may be maintained at a lower level, the tendency to defer marriage must increase in arithmetical progression. For, "if a certain number are only *deferred* for a period, these marriages will come off in the next succeeding period, and if only a similar number are again deferred these last will cancel the former, and the rate will go up to its former level again." Such an increasing tendency to defer marriage will naturally result in a steady rise in the average age of persons marrying, and similarly a steadily decreasing marriage age will also be accompanied by a constant though much lower marriage rate.

Assuming that the returns of minors marrying indicate the variations in the strength of the tendency to defer marriage, we may conclude that the age at which marriage was on the average contracted in England and Wales steadily declined up to 1874, and that it has been steadily rising ever since,—the conditions necessary for a sudden fall after 1874 from a higher to a lower stationary marriage rate.

The rapid fall in the marriage rate was followed by a fall in the birth rate, which continued until 1890,—a period of fourteen years. Since 1890 the birth rate has been very unsteady, but apparently manifesting a tendency to decline. It is not improbable, however, that the depressing effects of the fall in the marriage rate ceased about 1890. In 1887 the ratio of births to marriages was the same as in 1876,—the year in which the drop in the marriage rate set in. But the average ratio for the period 1887-95 was below the average

for 1857-76. The difference may be attributed almost entirely to the continued fall (slightly interrupted during periods of business depression) in the illegitimate birth rate, since the ratio of legitimate births to marriages — the true test of a declining rate — was practically the same in both periods. The decline in this ratio since 1889 is not due to a decrease in the legitimate birth rate, but is rather indicative of an upward movement in the marriage rate. The ratio may diminish for a number of years even if the marriage and birth rate should rise.

These considerations point to the conclusion that, while illegitimacy may continue to decline, no material fall in the birth rate in the near future need be apprehended. Indeed, it is not unlikely that the marriage and birth rates are even now on the point of rising.

H. J. GERLING.

BIRTH RATE IN FRANCE.

L'affaiblissement de la natalité est-il un bien ou un mal? By Charles Morene. In *La Réforme Sociale*. July, 1898.

The object of this article is to show that from an economic standpoint the low birth rate in France is an evil, and also that the evil is not remedied by immigration.

An increase in the means of subsistence may cause an increase in the birth rate. But other causes, religious, moral, and physiological, may also cause an increase in the rate. In an increasing population there will be a growing demand for labor, which, combined with the effort to maintain if not to improve the standard of living, will lead to a quest for new employments and wider markets. The intelligent and well-to-do attracted by the increased opportunities will direct their attention to business pursuits instead of seeking to enter the service of the State, as they now do in France.

In this manner an increase in the population of intelligent and energetic races that have accumulated capital will stimulate enterprise and thus contribute to the country's prosperity. Thus the wealth of England and of Germany has steadily risen, while France, whose population is stationary, is in danger of losing her old preponderance.

The low birth rate in France being, therefore, a symptom of decay is a great and threatening evil.

Is a sufficient economic advantage gained by immigration to overcome this evil? It seems not. The presence of foreigners does not materially increase the proportion of persons of productive age, as the percentage of children among them is quite as large as among the native French population. Further, a large proportion of the immigrants who come to France do not intend to remain, and many of those who do remain are not assimilated. An increase in the population due to immigration is, therefore, largely fictitious. The foreigners, moreover, are for the most part poor, and many of them, especially the Italians, are wretched and degraded, frequently forming a disturbing element in the community. Such a population can not add to the wealth and commercial prosperity of France. Immigration, therefore, does not contribute sufficiently to the economic advantages of France to compensate for the evil of the low birth rates.

H. J. GERLING.

AMERICAN STATISTICAL ASSOCIATION.

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CONSIDERATIONS IN GATHERING FORESTRY STATISTICS.*

BY B. E. FERNOW.

The call for statistics regarding our forest resources, their extent, consumption, and duration in connection with the tariff discussions has revealed the fact that we have but little if any reliable information on the subject, and has accentuated the need of more accurate knowledge.

In the expectation that an attempt may be made to secure the necessary funds for the purpose of getting this information, either in connection with the Census or independently, it may be of practical interest to point out what forestry statistics are and what their gathering involves.

Before approaching the subject of this paper I may be allowed to state my conception of the work of a statistician in general, since I have observed that misconceptions, even among so-called statisticians, seem prevalent.

The statistician to my mind is more than an enumerator. If he wishes to fulfill his true function he cannot, as a prominent official statistician once declared that he did, "count hogs, dogs, and logs alike." The sum totals thus obtained would probably be of little practical value. If, as I conceive,

* Presented at the Meeting of the American Statistical Association in Washington, May 27, 1897.

the statistician is not only a recorder of the results of the past progress of development and civilization, but also acts as a guide for future progress, as an auxiliary to the economist and legislator, he must have more than numerical knowledge of the matter which he subjects to statistical inquiry; he must be conversant with its meaning and position in the household of the nation and its relative importance; its relation to other fields and its nature in general. To be sure, facts, and facts only, are the object of the statistician, but facts in relation, concrete facts, which will give a picture of the condition of any one phase of our civilization, of our industrial life, intercourse or development; facts which may serve as a basis for the discovery of the law of progress, which will give us insight into the causes of present conditions and means of judging, if not forecasting, and directing future conditions. His information, in other words, must lend itself to *statical* use.

Hence, in the gathering of these facts, if they are to be useful, the object for which they are to be used cannot entirely be overlooked by the statistician, and his method of investigation and statement will, in part, at least have to be formulated with this object in view to insure adequacy of the results of his inquiry.

There are some facts that can be ascertained by mere enumeration, and the methods of the census-taker suffice for these. There are other facts which are beyond the reach of the census-taker and his methods; facts which require the employment of an expert and special methods.

I claim, then, that in the first place the statistician who proposes to ascertain facts relating to forestry matters must have some knowledge of the forest and its nature, and of the object, relations, and methods of the forest industries; and, secondly, he must be sufficient of a forestry expert to be able to devise methods which will produce adequate results from the inquiry.

It may be well also to point out that the absolute truth can rarely if ever be found. Truth is only relatively true. Almost all statistics, especially when referring to a large field, are only approximations to a greater or smaller degree, and in most fields, by the nature of things, even with the best methods, can be only approximations. As we will shall see, forestry statistics, like all crop statistics, are of this class.

The approximations may be closer or less close according to the methods pursued, and here again the object in view will determine the choice of methods. We must make up our mind as to what degree of accuracy and approximation we may be satisfied with before starting our investigation. Thus the statistics which the census statistician gathers to present a picture of our conditions as a nation would never satisfy, and should not attempt to satisfy, the needs of a commercial transaction.

Forestry is the rational use of the soil for wood crops just as agriculture is the rational use of the soil for food crops. Rational use of the soil requires a division of the same and the assignment of different portions to food crops and to wood crops. In the well-ordered State the soils most fit for agriculture are devoted to systematic cultivation of food crops as fields and pastures; but just so should the non-agricultural soils, the *absolute* forest soils, be devoted to the systematic cultivation of wood crops. When such a disposition or distribution and use of soils is accomplished the highest state of civilization from the cultural point of view is reached. Since, then, the statistician, especially the census statistician, has for his final task to measure the state of our civilization, the distribution of farm and forest area forms a proper object of his inquiry.

Wood growth fulfills a twofold function; not only does it supply materials most necessary to civilization, but it forms a condition of the earth's surface, which is known or believed to have a determinative influence on other cultural conditions, namely, those of climate, soil, and waterflow. Especially in

the last two directions the forest cover in certain situations, on hills, slopes, and mountains, exercises a potent influence in preventing erosion of soils, and in regulating the drainage of rain and snow waters, thereby decreasing the excess and frequency of high and low water stages, both in the water channels and the subterranean ground waters.

The forest, therefore, forms a special cultural element aside from the material which it supplies, and hence forestry statistics must have two objects in view, namely, to furnish information regarding the material supplies of the forest resource, and information regarding its conditions with reference to the other mentioned conditions which the forest cover influences or predicates. We may at once distinguish "supply" forests and "protective" forests. As a rule the two functions are or should be exercised simultaneously, but it is possible that there exist, and in reality there do exist, many forest areas which, while protective in an efficient manner, as supplies are of no significance. Hence, the knowledge of the forest area of a country by itself is meaningless, either as far as wood supplies or cultural condition is concerned; its character and conditions and its topographical location must also be known.

To ascertain the area of a forest cover would appear a simple task. Yet even here the indefiniteness of the term "forest" makes it necessary to exercise judgment, and it would be difficult to direct a mere enumerator with some definite rule by which to segregate. To be sure, the whole earth almost is a potential forest, *i. e.*, is capable of supporting and eventually may cover itself with tree growth, but from the point of view of present statistical inquiry the present condition and value of the woodland or its prospective condition and value within the present and perhaps next generation, either as a present or prospective supply forest or as a desirable protective cover, can alone enter into consideration.

It will, then, be necessary for the statistician to have a conception as to what to consider as forest growth, and, furthermore, classification of the area is necessary, based upon topography, soil conditions, kinds composing the wood growth, density and age of the same.

I may stop long enough to try to define what a forest is. The English lexicographers seem to consider large extent and virgin or natural growth, an absence of cultivation, as distinctive attributes to the word "forest," while the word "woodlands" is vaguely and inconsistently defined as the generic term for land covered or interspersed with trees and of *less extent* than a forest, or else land on which "trees are suffered to grow either for fuel or timber" (Webster), accentuating thereby relation to the uses of man.

I believe that etymology, linguistic sense, and actual usage, especially in later times, since the subject of forests and forestry has become prominent, would warrant us in defining more precisely: *woodland* as the general or generic term for land naturally covered with woody growth in contradistinction to land not so covered; *forest* as the restricted or specific term, namely, woodland, whether of natural growth or planted by man, considered in relation to the economic interests of man, and from the standpoint of national economy as an object of man's care; a woodland placed under management for "forest purposes," and, we may also add, exhibiting "forest conditions." These last limitations are important.

By the first restriction we exclude at once those lands covered with trees or woody growth which serve other than forest purposes, such as coffee plantations, orchards which are grown for fruit, roadside plantings and parks which are planted or kept for shade and ornament, windbreaks, consisting of single rows of trees which, although like the other conditions of tree growth mentioned may answer some functions of forest growth, are not primarily intended to fulfill forest purposes, and lack what I have called "forest conditions." These imply a more or less exclusive occupancy

of the soil by arborescent growth, a close stand of trees, as a consequence of which a form of individual tree growth results unlike that produced in the open stand, and a more or less dense shading of the ground which excludes largely the lower vegetation.

By so much as these conditions are deficient by so much does the forest fail to deserve the name and to fulfill its economic functions, namely, as a source of useful material, and as a factor in influencing climatic soil and water conditions.

As an example of a disappointing piece of work in this line we may take the maps of Massachusetts and Connecticut, prepared by the Geological Survey, on which the forest area is noted all in one color. Who knows anything from the economist's point of view of the forest area of the State by looking at this map? Mere waste brush lands which for a generation or more may remain valueless, either as supply or protective forest, are treated the same as any old timber growth, furnishing logs to the mill and cover to the ground. Without classification and additional notes the map conveys to the uninitiated the idea that the State is well provided with valuable forest growth, indeed is superabundantly so provided; and yet we know that there is no timber worth speaking of to be found in these States, that the composition and condition of much of the woodlands does not promise much for the future in this respect, and that, even as a protective cover, they are ineffective. The information thus stated is a snare and a delusion. I do not question the good intention in thus segregating the lands which are not used agriculturally, but the usefulness of the data from the forestry point of view is not apparent.

To enable us to estimate cultural conditions merely it is desirable to know whether the woodland is located on non-agricultural or agricultural soils, on slopes and mountain tops (which to be sure the topographic contour lines allow in part to judge), and the condition of the cover, whether open or

dense, and even whether old or young, and in what stage of development.

From the standpoint of supplies it becomes necessary also to know something about the composition, for a large part of the trees growing in a woodland are weeds,—useless and worse than useless; further the age of valuable supply areas, and the quantity of material either on hand or prospective needs to be known. To be sure no mere topographer and surveyor, however excellent a man, and no mere enumerator, is capable of furnishing such information about a crop whose nature not even those who harvest it understand. It is only a professional forester who can judge the economic value of such a crop and describe its conditions in a manner which will permit a diagnosis of the question of supply or even cultural condition. In the case of agricultural use of the soil or agricultural crops which ripen and are harvested the same season they are put in the ground the matter is much more simple; the opinion of the owner as to the prospective quantity or value or the opinion of any agriculturist can be readily accepted as approximating the truth sufficiently.

In considering a forest crop, especially one in natural condition, such as we have to deal with where forestry, the art of growing useful wood crops, is not yet applied, we must keep in mind that of the many trees growing only a few kinds serve our industrial purposes, the rest, excepting as they may serve as soil cover or firewood, are weeds.

As a result of the method of culling, which our lumbermen have pursued in harvesting the valuable virgin growth, we shall find that large areas, which to the unprofessional eye appear an unbroken forest, contain in reality hardly any kinds or individual trees fit for industrial uses. Worse, by this gradual culling out of the useful kinds, the ground is left to the occupancy of the tree weeds, which must first be removed to give room for a valuable forest crop, just as the forest had to be removed to make room for the agricultural use of the soil. Thus the two States of Massachusetts and

Connecticut, for which the United States Geological Survey maps show one-half or more of their areas under forest, do not contain any considerable areas on which wood useful in the arts is growing. Not only is the number of tree weeds usually in preponderance, but the valuable hardwoods are mostly sprouts from the stump, which, growing rapidly for the first 20 or 30 years, cease to grow early, and rarely attain log size in a reasonable time. Nothing but seedling forest growth will satisfy the demands of our wood industries.

We see, then, that statistics of forest areas, even if we are careful to rule out all mere waste brushlands, which in generations to come will not assume forest aspect, are of little or no use for any practical purposes unless we know also something of their condition. This is true not only from the crop aspect of the forest cover but also from the protective aspect. For whether the forest cover is capable of influencing climatic, soil, or water conditions depends entirely upon its own conditions.

A few scattered trees and shrubs over a surface robbed by fire of the litter and vegetable mould, which is the essential feature of a forest floor, trampled by sheep and cattle either into a compact smooth thrashing floor or into an impalpable dust, can hardly be expected to be of the same value as a dense stand of timber interposing impenetrable shade to the drying influences of the sun, an impenetrable barrier to cold and hot blasts, with a floor of vegetable mould, the accumulation of centuries, which keeps the soil below porous and open, retains the water and gives it up gradually to the lower strata and lower levels instead of turning it into rapid surface drainage. If merely as a soil cover the value of a forest depends upon its condition, how much more so when considered as a crop.

Of all the kinds of wood in which our country abounds the conifers, and especially the pines, are the most useful, the most generally used and the most difficult to do without. So true is it that our civilizations are built of pine and its

congeners that such countries as Brazil and Australia, both heavily wooded, are forced to become large importers of our coniferous article. Two-thirds to three-fourths of all the wood of log size which we use is of this description. Hence, the statistician ought to give special attention to this part of our resource, its present condition and future promise.

If wood alone were our need we might dispense with forestry and forestry statistics; for supplies of wood are, and for a long time will be, plentiful through nature's unaided efforts.

If only hardwoods, so-called, were needed we should still be able to defer our concern regarding supplies, for the reproduction of these accomplishes itself by seed as well as by sprouts from the stump. The chances are, therefore, at least double those of the conifers, which reproduce only, or almost only, by seed. It is coniferous wood of good quality and serviceable size that our civilization is mainly concerned in, and as this is rapidly culled from the virgin forest and under the careless treatment which our woodland areas receive does not reproduce itself as rapidly, while the young growth suffer much more severely from the forest fires than the hardwoods, the attention of the economist and statistician is or should be naturally directed to this important part of the question first, to this most needful and useful forest crop.

There are two considerations in which a forest crop differs from any other kind of crop, and in which forestry, the industry concerned in wood production, differs from any other industry and renders it *sui generis* in its technical and financial as well as economic aspects. These are the time element in the production of the crop and the indeterminateness of the maturity of the crop.

We must repeat again and again that it is not simply trees or wood that the forest grower, the lumberman, and the wood consumer desire, but wood of given qualities; wood of size and fit for industrial uses. To produce the timber of size

from which our lumber is cut at present has taken from 150 to 200 and more years, and even with the best skill in aiding nature's efforts a serviceable pine log may not be expected in less than 75 to 100 years, and *then* we shall have to scale down considerably our requirements as to quality from our present standard. The time to harvest the crop is not a matter determined by the season, as in agricultural crops, but by two variable considerations, namely, technical or financial, either the serviceableness of the size of the log or the profitableness of cutting it, or both. The size when a log is serviceable depends not only on the use to which it is put, but also on the practice of the market and mill, and these influence, with other considerations, the question when it is profitable to cut it. The statistician cannot help considering these matters, for whether the mills are sawing only logs 10, 12 or 14 inches in diameter, as was the practice in the pineries in 1880, or whether they have adapted their machinery and methods to scale down to 5 inches, as is now done in some parts of Maine and elsewhere, must make a difference in his statement of supplies at hand or becoming available.

The question of profitableness in our country has so far been determined only from the standpoint of the harvester, the cost to the logger and mill man, — by no means from the standpoint of the forest owner or wood producer, and much less from the standpoint of national economy. Of the wood standing on an average acre of virgin growth which is being cut for lumber under our present methods, at best not more than 50 per cent of the total wood volume, and usually less than 20 or 25 per cent, is utilized; the balance is waste or left to grow, the waste being due to avoidable and unavoidable causes on account of absence of market for inferior parts, tops, etc., on account of defects, careless felling, uneconomical handling, etc.

Thus an interesting account is given by the Forest Commissioner of Maine with regard to a typical acre of spruce land: —

11] *Considerations in Gathering Forestry Statistics.* 165

Original stand, 52 trees of 12 in. and over, . . .	1,800 cub. ft.
214 " of 3-12 in.	1,440 " "
	<hr/> 2,800 cub. ft.
Utilized 36½ per cent in logs hauled,	1,020 cub. ft.
which in the mill may furnish between 400 and 500 cub. ft. in the shape of lumber.	
Wasted 11 per cent in stumps and tops,	340
Destroyed in cutting, 17 per cent,	480
Blown down, 17 per cent,	<hr/> 480
	1,300 cub. ft.
Left to grow, 17 per cent,	480 " "
	<hr/> 2,800 cub. ft.

The layman and the average inexpert statistician can hardly realize how much difference the size of the log makes in the output at the mill. Thus in the average mill practice, while from a log thirty inches in diameter 72 per cent may be realized in the lumber, a log of ten inches will yield only 85 per cent of its volume in the shape of lumber, and of a log of five inches diameter, the smallest now cut, three-quarters more goes into the slab and saw-dust pile. A consideration of this kind will forcibly impress the statistician and economist with the fact that whatever small profit the logger may make from the cutting of small trees, it is an enormous loss to the national capital, for the available quantity as well as the value of the accumulated wood crop increases by the mere annual accretions of wood, in geometric, not in arithmetical, ratio, for quite a time.

The lumberman of the present day is not a wood producer; he is merely a harvester,—a miner taking the pay ore, a butcher slaughtering the herd without concern of replenishing it; he is not a breeder, not a forester. What he leaves he leaves simply because it does not pay to take it; not because he expects that it will grow into serviceable material. For reproduction he not only makes no provision, but by his methods he prevents it, and forest fires do their part to aid him.

The small trees left by him, which are not always young trees by any means, but "runts" that have struggled under

the shade of the taller trees, sometimes for a hundred years, grow on after the first logging, and after some time there are again a few trees which have attained a size fit for the saw, and the logger returns for a "second crop," and he talks about the so-called "second growth" as if it were reproduction. Thus he claims, for instance, that the spruce forest in Maine renews itself every 20 years. As a matter of fact in many if not most cases there is no renewal or hardly any; few new trees start to grow, only those left of the first crop as found produced by nature, having been given light, have grown to serviceable size. Reproduction takes place now and then under favorable conditions, but wherever a species is culled from a mixed growth, and most of our woods are so culled, it is only a question of a short time when it is practically exterminated, the shade of the unserviceable trees, the tree weeds that were left preventing or reducing the chance of reproduction.

The logger or lumberman of today is concerned only in the quantity of immediately serviceable log timber. He has hardly yet given a thought to the future. But the economist, and his colaborer the statistician, if not the harvester, must pay attention to the conditions of the growing crop as well as of the grown crop.

The quantities available for present mill use could be closely approximated either by actual measurement or estimate of the standing timber by expert estimators. A really good estimator can come within 10 to 20 per cent of the more exact measurements, and produces invariably an underestimate, for he has usually been employed by purchasers of timber, and for safety's sake he must remain below the truth. If he does his work conscientiously he ascertains, by a few measurements in every new territory he enters, and, preferably, every day he is at work, to keep his eye in training, the quantity produced by an average-sized tree, and then counts the serviceable trees, and by multiplication he arrives at the total for each 40 acres, a convenient area to

handle, making allowance for defects (which is a very variable quantity). It is apparent that such a method, which is the one employed for commercial transactions, would hardly be practicable for mere statistical purposes; the cost of such a canvass, which cannot be less than 2 cents per acre for all timber land, forbids its use over an area counting by millions of acres.

Again we must realize that such statistics as the census maker can gather are not meant for commercial use directly. Approximations only are wanted within a reasonable degree of accuracy, such as the economist and legislator require to form a judgment of general conditions. In the present case we shall have to devise a method of averages applicable over large areas of typical forest growths. Needless to say, these averages must be determined with care by competent experts able to select and recognize types and classify the areas accordingly.

If there is difficulty and need of expert judgment in determining quantity and value of standing merchantable timber which is within the actual vision of the estimator, how much more difficulty must be found, and expert knowledge be needed, to judge the prospective quantity and value of the unperfected crop which is the promise of the future. Here, too, average methods must be devised, based upon the ascertainment of the rate of growth for typical areas. To be sure different degrees of accuracy in the method can be employed according to the greater importance of any or one part of the resource. Thus it would be desirable to ascertain the conditions of our coniferous resource with more precision than of our hardwoods.

This paper is intended to be merely suggestive, preliminary — not exhaustive. We may, therefore, now only briefly summarize the knowledge which we might expect a tolerably satisfactory statistical inquiry into our forest conditions and forest resource to produce as a basis for statistical purposes.

1. The area of forest cover, classified according to —
 - (a) location with regard to topography, hydrography, soil conditions, means of transportation, markets;
 - (b) composition, *i. e.*, relative occurrence of merchantable kinds;
 - (c) condition as to density and character of growth and soil cover, age, damage by fire, etc., treatment.
2. The value of the forest resource, both expressed in quantities of available or prospective crop material (the latter based on rate of growth), segregated by kinds and character and the money value as far as ascertainable; also with reference to protective functions and cultural significance.
3. The proprietary conditions; State, communal, institute ownership which promises greater stability as against private ownership; size of parcels owned individually, which predicates manner of treatment.
4. Prices of crops, and cost of production and harvest.
5. The market conditions and statistics of wood-consuming industries.

On this part of the inquiry which concerns itself with the harvest, disposal and use of the forest products, I have not enlarged, for there is little or no difference in the gathering of statistics of these industries from those of other industries, except perhaps that as many of the forest industries are carried on away from centers of production and as a side business in connection with other industries more careful search may be necessary to come nearer to the approximation of the truth. In this direction I believe the methods elaborated in the Eleventh Census with few changes, based on the experience of that census, may answer the purpose.

REVIEWS AND MISCELLANY.

LIBRARY OF AMERICAN STATISTICAL ASSOCIATION.

The following extracts from the Bulletins of the Boston Public Library explain the transfer of the collection of books of the American Statistical Association from rooms in the Institute of Technology to the Public Library:—

STATISTICAL DEPARTMENT.—The Library of the American Statistical Association has been received, in accordance with the following letter of gift and vote of acceptance, and is now in process of examination. When this is completed, and the material is in form to be consulted, notice will be given in this department of the Bulletin.

[From the Trustees' Records, June 16, 1898.]

AMERICAN STATISTICAL ASSOCIATION.

BOSTON, MASS., June 16, 1898.

To the Trustees of the Boston Public Library:

GENTLEMEN,—The American Statistical Association, of which General Walker was president for so many years, until the time of his death, and of which Colonel Wright is now president, has a valuable library of statistical works, especially rich in public documents of foreign countries . . . At the last meeting of the Association, held in April of this year, the Library Committee of the Association was given power to transfer the library to the Trustees of the Boston Public Library if they were willing to accept the gift, the only condition being that the purely statistical portion of the library should be kept together, and that members of the Association should have free access to the shelves of this collection . . .

Very truly yours,

(Signed) DAVIS R. DEWEY, *Secretary.*

Voted, that the above gift of the Library of the American Statistical Association be accepted, and that the Librarian arrange for the transfer of the material at such times and in such manner as may be convenient.

DIVISION OF DOCUMENTS AND STATISTICS.—A reorganization of the collections of documents is under way, in the charge of Mr. Worthington C. Ford, late Chief of the Bureau of Statistics of the Treasury Department, Washington. Material already on the shelves will be assembled, systematic effort made to complete the collections, and the scope of the whole increased. The Library of the American Statistical Association, the gift of which was noticed in the November bulletin, has been added to the collections belonging to the Library.

The Division will at no distant day be fully equipped for the service of the public. Not only are the issues of the United States government received, but the leading publications of the different States and municipalities are on file. The foreign reports of a corresponding character will be added, and special care paid to keeping the department in touch with the important problems of government now under discussion in Europe and America. Statistics on population, finance, commerce, transportation, migration, and colonies, among other topics, will receive special attention.

DEATHS IN CHILD-BIRTH.

An elaborate article on *Deaths in Child-birth in New South Wales*, by T. A. Coghlan, is published in the *Journal of the Royal Statistical Society* for September, 1898. The investigation is founded on the deaths and births registered in New South Wales during the four years 1893-96. In regard to the deaths from each confinement the information available covers only three years, 1894-96, during which there were 115,669 confinements and 813 deaths due to child-birth. Of these, 9920 were confinements of unmarried women. The following table relates to married women only:—

Confinements.	Births.	Deaths in Child-birth.	Confinements.	Births.	Deaths in Child-birth.
1.....	20,145	175	13.....	594	7
2.....	17,208	79	14.....	261	1
3.....	14,908	85	15.....	128	1
4.....	12,319	61	16.....	56	..
5.....	10,306	67	17.....	32	..
6.....	8,553	56	18.....	8	1
7.....	6,806	43	19.....	5	..
8.....	5,302	40	20.....	1	..
9.....	3,805	40	21.....	..	..
10.....	2,583	21	22.....	..	..
11.....	1,727	16	23.....	2	..
12.....	978	21			
				105,749	714

A table is also presented showing the probability of death during confinement as follows : —

Confinement.	Probability of Death during Confinement.	
	First Approximation.	Adjusted Figures.
1.....	0.008687	0.0087
2.....	0.004502	0.0066
3.....	0.005702	0.0055
4.....	0.004952	0.0052
5.....	0.006445	0.0062
6.....	0.006547	0.0067
7.....	0.006316	0.0064
8.....	0.007544	0.0074
9.....	0.010512	0.0084
10.....	0.006130	0.0097
11.....	0.009265	0.0118
12.....	0.021472	0.0142
13.....	0.013109	0.0168

The risk attending the first birth is greater than that of any subsequent one up to the ninth. The minimum risk would appear to be at the fourth, but the increase in risk at subsequent confinements may be due to the increased age of the mother and not to a loss of vitality or other cause. When ages are taken into account it is found that the risk attending upon the first birth is at a minimum at the

22nd or 23rd year, and, after five years, increases rather rapidly with age. Age is a great factor in the risk, but even with the increased age the risk attending the first confinement is greater than any subsequent one up to the ninth.

The following table shows the average number of children to women marrying at any age, the husband's age assumed to be five years older than wife's:—

Age.		Probability of Birth during the Year.	Children. Annually.	Total Average Number of Children to Women Marrying at Age in first column.
Female.	Male.			
20	25	0.445	0.4420	7.2217
21	26	0.428	0.4238	6.7797
22	27	0.413	0.3987	6.3559
23	28	0.398	0.3937	5.9572
24	29	0.385	0.3806	5.5835
25	30	0.372	0.3676	5.1829
26	31	0.358	0.3425	4.8253
27	32	0.346	0.3415	4.4828
28	33	0.335	0.3305	4.1413
29	34	0.327	0.3223	3.8108
30	35	0.318	0.3133	3.4885
31	36	0.311	0.3062	3.1752
32	37	0.304	0.2991	2.8690
33	38	0.297	0.2919	2.5699
34	39	0.289	0.2839	2.2780
35	40	0.279	0.2738	1.9941
36	41	0.270	0.2648	1.7303
37	42	0.258	0.2498	1.4555
38	43	0.245	0.2401	1.2127
39	44	0.228	0.2230	0.9726
40	45	0.200	0.1955	0.7496
41	46	0.169	0.1651	0.5541
42	47	0.125	0.1222	0.3890
43	48	0.085	0.0926	0.2663
44	49	0.070	0.0682	0.1742
45	50	0.048	0.0467	0.1080
46	51	0.030	0.0292	0.0593
47	52	0.017	0.0165	0.0301
48	53	0.007	0.0068	0.0136
49	54	0.004	0.0039	0.0068
50	55	0.002	0.0019	0.0029

The next table shows the probability of death from each confinement:—

Confinement.	Probability of Dying.	Probability of Living.
1.....	0.0067	0.9913
2.....	0.0066	0.9934
3.....	0.0055	0.9945
4.....	0.0053	0.9948
5.....	0.0053	0.9948
6.....	0.0057	0.9943
7.....	0.0064	0.9936
8.....	0.0074	0.9926

In the discussion which followed it was asserted that the maternal mortality in London was not nearly as high as that shown for New South Wales. A mortality of 1 per cent would be considered monstrous. If New South Wales were so unfortunate as to have a mortality of 1 in 121, something should be done.

NOTE ON THE TREASURY ESTIMATES FOR 1900.

At the second session of the 54th Congress there was appropriated for the expenses of the government in the fiscal year 1898, a year of peace, the sum of \$488,069,740.* On the following year the appropriations for the same purposes would have been \$453,661,078. The war appropriations increased this sum to \$798,805,690. The Secretary of the Treasury asks in his estimates for the year 1900 the sum of \$588,782,491. This is an increase of 36 per cent over the appropriations for 1898, and of 32 per cent over those for 1899. Almost every dollar of this increase is for unproductive expenditure. Of this increased expenditure the leading items are:—

	1898.	1900.	Increase.
Army,	\$33,139,344	\$145,119,432	\$121,980,088
Navy,	33,008,234	39,114,652	6,111,418
Pensions,	141,263,530	145,233,530	3,969,960
Fortifications (home),	9,517,141	12,151,308	2,634,757

These four items account for an increase of \$184,706,218 out of a total increase of \$155,712,751, or 86 per cent.

Hardly a department of the government does not add items of cost incident to the control of the late Spanish possessions, but we need not stop to enumerate them.

* Post office appropriations and expenditures are omitted.

The government of the islands will be a military government. But no sums are asked to construct and equip the necessary coast and harbor defences necessary to such government; or for the improvement of harbors and waterways, cleansing of cities and towns, relief of the needy, and the many items of expense incident to the occupation of distant and unprotected possessions, populated by poor and untaught peoples, oppressed into insurrection, and undisciplined to control of any kind. The cost of administering justice will not be small; the actual rebellion of the people against our rule is a possibility, even a probability; and the sullen opposition of a home-rule element must be faced. The islands will not be self-supporting to the extent of providing for such contingencies as rebellion, and so the annual cost to the people of the United States must be increased, even as an insurance against an uprising.

Assuming that the War Department has asked sufficient for the mere occupation of the islands, and the enlarged military establishment for police purposes, it will be seen there are other large and uncertain items of cost unprovided for, and the annual appropriations will in future be nearer \$200,000,000 in excess of those of 1898 than \$155,712,751.

An annual increased expenditure of \$200,000,000 means a continuance of "war taxation" and an addition of new taxes, or borrowing by the government to meet current expenses of government.

The total revenue from the two great and regular sources of income for the fiscal year 1898 was:—

From internal revenue,	\$170,900,641
Customs,	149,575,063
Miscellaneous sources,	20,000,000
Total,	<u>\$340,475,703</u>

The amounts derived from the sales of the Pacific Railroads, a windfall not to be repeated, brought the total income to \$405,321,335. Compared with the appropriations for 1898 there would have been a deficit of \$27,748,405; or excluding the sums received from the Pacific Railroads, one of \$92,499,629. This on a peace basis!

Mr. Gages estimates the revenue for 1900 to be:—

Customs,	\$205,000,000
Internal revenue,	235,000,000
Miscellaneous,	20,000,000
Total,	<u>\$510,000,000</u>

giving a deficit of \$78,782,491 for that year — a year of peace, with war taxation to produce revenue. Every dollar of additional revenue from customs and internal revenue will be swallowed up in unproductive expenditure incident to the occupation of the late Spanish islands.

Estimates of the Treasury err on the side of a favorable showing. Trade must continue in high prosperity to yield the amount expected, and the condition thus pictured is the best that can be shown. For every good year there will be one or more bad years, when the deficit will be increased. For the estimates of expenditure for 1900 are such as must continue for many years; the revenue is placed at the highest notch.

An average deficit of \$100,000,000 a year will not be an excessive estimate. This means the taking each year from productive industry of a sum representing the interest (at 3 per cent) on \$3,333,000,000, and is equivalent to adding that sum to the national debt, but with this difference: the bond of the national debt is redeemable after a certain number of years, but this new charge represents a perpetual debt.

The capital of the debt of the United States at the end of 1898 was \$1,047,320,000. The new expenditure will be equivalent to increasing it to \$4,380,000,000. The debt of France is \$6,218,871,340; Great Britain, \$3,203,868,395. This gives us the second largest debt in the world!

In 1898 the per capita rate of taxation for national purposes was \$4.34.

On the estimates of Mr. Gage the rate in 1900 will be \$6.36 — an increase of more than 46 per cent.

This rests on the assumption that the estimates are correct, and takes no account of the reduction in customs incident to the free admission into the United States of tropical products. This would result in an additional sum of \$80,000,000 to be obtained by new taxes, or a burden of \$1.04 on every head of population, to be paid in taxes other than the customs or internal taxes now in force.

But the country is now taxed at a war rate, and where are the new sources of revenue to be found to meet this demand for nearly \$160,000,000 a year?

WORTHINGTON C. FORD.

NOTES ON VITAL STATISTICS.

Ville de Bruxelles. Service d'hygiène, son organisation, et son mode de fonctionnement. By Dr. E. Janssens. Brussels, 1898. Pp. 52; diagram and plates.

This report opens with a striking diagram, showing on pages facing each other the administrative work of the division of public hygiene and the progressive decrease in mortality in the city of Brussels between 1874 and 1896. This volume well illustrates what a board of health coöperating with a developing public opinion and advance in medical knowledge can do for the saving of life. The results are illustrated in the following table:—

Quinquennial Periods.	Population.	Annual Average of Deaths.	The Rate of Mortality per 1,000 Inhabitants.	The Annual Average of Deaths by Contagious Diseases.	The Rate of Mortality per 10,000 Inhabitants.
1867-71	170,000	4,965.8	29.2	846.6	49.9
1872-76	163,914	4,492.4	27.4	349.2	21.3
1877-81	165,366	4,180.0	25.3	263.4	15.3
1882-86	171,563	4,240.0	24.7	331.8	18.8
1887-91	181,046	4,019.6	22.3	267.4	14.2
1892-96	189,303	3,778.6	20.0	216.2	11.4
1897-	197,695	3,223	16.3	125.0	6.3

The work of medical inspection of schools is summarized.

The *Statistische Monatschrift* for June-July, 1898, contains an exhaustive article by Dr. Presl on Public Health in Austria since 1848. It is a complete review of mortality tables and statistics of various diseases.

The Statistical Office of Buenos Ayres, under the direction of Carlos P. Salas, has published a monograph entitled *Memoria Demográfica* for 1895 (La Plata, 1898) which contains several maps showing the density of population, its distribution, the distribution of foreign population, the distribution of marriages, births, illegitimate births, general mortality, infant mortality, and mortality by various diseases.

Marriages, Naissances et Décès en Suisse, 1871-80. Deuxième Partie: les Naissances. Published by the Bureau of Statistics, Federal Department of the Interior. Berne: 1897.

This is an exhaustive investigation of the statistics of births covering a period of 20 years. The particular topics discussed are still-birth, illegitimacy, multiple births, births classed according to viability, the fecundity of women, etc. There are 50 pages of textual analysis. The tables are supplemented by a series of tinted maps illustrating the various points considered.

The *Therapeutische Monatshefte* for September, 1898, contains an article on *Serum Statistics* by Dr. Josef von Körösey, Director of Municipal Statistics of Budapest.

In the *Annual Report of the Board of Health of Cambridge, Mass., for the year ending December 31, 1897*, a summarized life table for Cambridge is presented:—

ANNUAL DEATH RATES FROM ALL CAUSES PER 1000 LIVING.

Age.	Males.	Females.	Persons.
All ages.....	18.15	17.13	17.63
0-1 year.....	234.76	185.38	205.24
1-2 years.....	81.59	101.88	91.76
2-3 ".....	31.60	22.97	22.30
3-4 ".....	22.96	18.06	20.78
4-5 ".....	15.45	9.21	12.40
0-5 ".....	74.12	65.13	69.61
5-10 ".....	9.13	4.10	6.59
10-15 ".....	3.19	4.41	3.79
15-20 ".....	3.41	7.53	5.44
20-25 ".....	6.32	6.63	6.47
25-30 ".....	9.67	7.52	8.67
30-35 ".....	9.31	10.29	9.83
35-40 ".....	22.81	16.82	20.02
40-45 ".....	43.06	31.30	38.44
45-50 ".....	73.81	78.59	78.28
Over 50 years.....	177.14	168.19	171.81

Fifth Annual Report upon the Births, Marriages, Divorces, and Deaths in the State of Maine for the year ending December 31, 1896. Augusta, 1898. Pp. 238.

The birth rates, marriage rates, and death rates are computed for 1896 on population of 1890. Of the births, 62.84 per cent were of

American born parents, as compared with 78.18 in Vermont, 81.58 in Massachusetts, 81.88 in Rhode Island, and 41.2 in Connecticut. The birth rate of all children, according to the returns, was 22.28. The divorce rate in Maine appears to be high. In 1896 there was one divorce in every 8.3 marriages solemnized; in Vermont one to 15.7; in Massachusetts one to 19.2; in Rhode Island one to 9.2; and in Connecticut one to 14.9.

LABOR INQUIRIES.

Labor Copartnership. Notes of a Visit to Coöperative Workshops, Factories, and Homes in Great Britain and Ireland, in which Employer, Employee, and Consumer share in Ownership, Management, and Results. By Henry Demerest Lloyd. Illustrated. New York. 1898. Pp. 351.

This is an extended account of a journey which Mr. Lloyd made in 1897 through various parts of England in order to learn exactly what was being done in the line of coöperative production. The work of the distributive stores in England is generally well known; of productive coöperation, however, there is ignorance. The author secured his information at first hand, visiting many places, talked with many directors and workmen, collected much ephemeral literature, and has presented his notes and statistics in a most convenient form. There are more than 150 productive establishments with an aggregate capital of over \$5,000,000. The experiments described include copartnership farms as well as factories.

The *Office du Travail* of Belgium has undertaken the publication of a new annual entitled *Annuaire de la Législation du Travail*. The first volume, that for 1897, has just been issued (Brussels, 1898. Pp. xii, 390). This does not cover the whole range of social legislation, but is confined to laws concerning the organization of labor, the right of combination and of strikes, the right of association, arbitration, conciliation, labor contract, apprenticeship, wages, health protection of the laborer, inspection, laws relating to accidents and workingmen's insurance. The text of the more important laws is accom-

panied by a note in regard to parliamentary work or to official inquiries which have brought them about. There is also a detailed alphabetical index. The work promises to be of great value to students. One hundred and four pages are given to Germany, 25 to Austria, 60 to Belgium, 70 to Great Britain, 5 to Norway, 28 to the Netherlands, 15 to Russia, 12 to Switzerland, and 35 to the United States.

The French *Office du Travail* has published an *Album graphique* entitled *Salaires et Durée du Travail dans l'Industrie Française*. (Paris, 1897. Plates 29.) It includes maps by departments, showing the distribution of the working population under consideration, the average day's wages by male workmen within the field of inquiry, expenditures, and the movement of wages. There are also ingenious charts in the form of rectangles, circles, and curves.

In the *Report on Strikes and Lockouts of 1897* (London, 1898. Pp. c, 171) it is noted that the general plan of the statistics has been changed only in one minor point. This is the omission of the tables of very small disputes involving less than ten persons, or less than one day's stoppage of work, unless the aggregate duration of a dispute exceeded 100 working days. It was found that in 106 of the disputes in 1897 the number of work people involved was 1649 only, and that the aggregate was less than 2800 working days. Such disputes are regarded as too trivial to affect any of the results from a statistical point of view.

The report also contains an account of the work done by various agencies for settling disputes, the text of certain amendments terminating these, and specimens of the forms used by the department when making its inquiries.

No. 8, October 1898, of the *Labor Bulletin of the Commonwealth of Massachusetts* has a special article on *Hours of Labor in Domestic Service*, based upon data furnished by the Committee on Domestic Reform of the Woman's Educational and Industrial Union of Boston. In all, the number of returns received covered 184 different families, in which 289 persons were employed,—individual schedules being furnished for 245 of these.

EDUCATIONAL STATISTICS.

In the annual *Report of the Board of Education of New Jersey for the year ending June 30, 1897* (Trenton, N. J., 1897), there are some interesting statistics on the lengths of the terms of service and experience of teachers. From these tables the following summary is made:—

Number who had been teaching 1 year or more,	548
“ between 1 and 5 years,	2,014
“ between 5 and 10 years,	1,347
“ between 10 and 15 years,	777
“ between 15 and 20 years,	489
“ between 20 and 25 years,	334
“ over 25 years,	360

The table showing terms of service in the same schools is as follows:—

Number who have been teaching in the same school 1 year or less, . .	1,563
“ between 1 and 5 years,	2,382
“ between 5 and 10 years,	962
“ between 10 and 15 years,	469
“ between 15 and 20 years,	232
“ between 20 and 25 years,	146
“ over 25 years,	115

According to chap. 496, Acts of 1898, Massachusetts has made a change in the taking of the school census, to take effect in September 1899, so that the census shall be taken in September at the beginning of the school year. The law provides that the school census shall contain the names and ages of all persons between 5 and 15 years of age, and of all minors over 14 years of age who cannot read at sight simple sentences in the English language. Hitherto the census has been taken in May.

Part II, vol. 3 of the *Massachusetts Census for 1895* is devoted to statistics of schools and school property, libraries and reading rooms. Under schools, statistics are given for public, private, truant, and normal schools. Under libraries and reading rooms, tables show the number of hours open weekly, and the year in which the libraries and reading rooms were opened.

FINANCE AND COMMERCE.

The Bureau of Statistics of the United States Treasury Department has published a useful compendium entitled *National, State, Private, and Savings Banks; Bonds, Paper Currency and Coin; Production and Value of Precious Metals; Coinage, etc., 1789-1898*.

For example, tables show the specie circulation, capital, and number of banks from 1774 to 1804, the resources and liabilities of the Second United States Bank from 1817 to 1837, the number and capital of State banks at different periods from 1792 to 1834, and the number of banks and their principal resources and liabilities by States from 1834 to 1897 (31 pages). There has been a rapid increase in the number of State banks within the past few years. Statistics are as follows:—

1887	1,422	1898	3,579
1888	1,403	1894	3,586
1889	1,671	1895	3,774
1890	2,101	1896	3,706
1891	2,572	1897	3,873
1892	3,191		

Large increases are shown in West Virginia, Mississippi, Kentucky, Missouri, Ohio, Illinois, Michigan, Wisconsin, and the Western States generally.

There has recently been published by the *Institut des Sciences Sociales* an *Atlas de Statistique Comparée de la Monnaie Métallique et Représentation et de l'Histoire des Prix*, by H. Denis. This contains three plates, showing the production of gold and silver by kilograms from 1492 until the present time, the annual value of the gold and silver production for the same period of time, and the consumption of the precious metals since 1851.

Thirteenth Annual Report of the Kansas Bureau of Labor and Industrial Statistics, 1897. W. L. A. Johnson, Commissioner. Topeka, 1898; pp. 400.

In addition to the customary investigations in regard to industries, wages, factory inspection, etc., a special investigation has been made in regard to assessment and taxation in 30 counties, using as a basis nearly 4000 transfers of real estate having a selling value of over \$4,000,000, together with comparisons of assessment and taxation on investments in manufacturing and industrial concerns consisting

of improvements, buildings, and machinery. This report is of special value, as furnishing abundant material, illustrating inequality of assessment in different portions of the same State. In Atchison County the proportion of assessed valuation to real or selling value ranged from 9 per cent to 53.3 per cent. An analysis of this portion of the report is added, written by Prof. Bemis of the Kansas State Agricultural College.

The October, 1898, issue of the *Monthly Summary of Commerce and Finance of the United States*, issued by the Bureau of Statistics of the Treasury Department, Washington, contains special tables on canal statistics. Statistics are given for traffic through the Suez Canal, Kaiser William Canal, Canadian Canal, St. Mary's Falls Canal, and the New York canals.

The English *Board of Trade Journal*, November, 1898, contains, on p. 522, an interesting map to illustrate the trade and shipping of northern Africa. Not only are the railways indicated, but the caravan trade routes through the Sahara desert. The map extends on the south as far as Timbuctoo, Gao, and Omdurman. The September and October numbers also contained articles and maps on the trade of the British, French, and German colonies on the east and west African coast. This series of articles will be of help in understanding the commercial importance of Africa to the European world.

The *Review of the Trade of India in 1897-98*, compiled by the Statistical Bureau of India, by J. A. Robertson (Simla, 1898, pp. 77), contains an interesting chart showing the course of exchange in India, and the price of silver in London from the beginning of 1893 to the end of August, 1898.

The November number of the *Street Railway Journal* contains the results of accounts kept by the Metropolitan Street Railway Company of New York City, on the cost of operating street railroads by electricity, cable, and horses for the year ending June 30, 1898. In brief, the accounts show as follows per mile: Cable, 16.42 cents; electricity, 10.23; horses, 17.87. An analysis of this report may also be found in the *Street Railway Supplement* of the *Commercial and Financial Chronicle*, November 26, 1898.

It is announced by the Secretary of the National Wool Association of Manufacturers that a third edition of the *Wool Book* will be published in February, 1899. The new edition will record the figures in regard to the imports of free wool, and also contain a large number of additional statistics not previously available.

In *Municipal Engineering* for November, 1898, p. 277, a table has been published, prepared by the committee on electric street lighting, for the American Society of Municipal Improvements, showing the cities in the United States which operate their own electric lighting plants at the present time. The table shows the cities with lamps of 2000 candle power, 1200 candle power, and smaller plants. Statistics of cost, price, etc., are furnished.

At the fifth annual convention of the American Society of Municipal Improvements, held at Washington, October 26th, a report was submitted by a Special Committee on Municipal Data which had been appointed the previous year. It is noted that the annual reports of municipal departments of different cities show great lack of uniformity. Much of this is due to the great differences in the methods of keeping accounts, and of beginning and carrying forward public works on account of variations in State laws, city charters, and local conditions. It is believed, however, that these variations can be reduced very greatly by a general agreement following as closely as possible forms of reports afterwards suggested. The committee subsequently presented form of water-works reports, sewerage reports, and street reports, and suggestions that forms for other lines of municipal work be prepared by experts in those lines. It is recommended that when the schedules are finally adopted by the committee, a resolution be passed by the Association recommending the adoption of the schedules by the Census Bureau of 1900. It is the opinion of this committee that a permanent census bureau should be established, and that the collection of municipal statistics properly belongs to such a bureau. The schedules of the reports suggested may be found on pp. 295-98 of the November number of *Municipal Engineering*.

In the *Twentieth Annual Report of the Board of Railway Commissioners of Iowa for the year ending June 30, 1897* (Des Moines, 1898), complaint is made that the Board has been unable to obtain certain statistics asked for of the different lines of railway. Some companies refuse or fail to return the desired information, assigning

as a reason that they cannot comply with the request of the Board, except upon what is known as a mileage basis, and suggesting that statistics upon such a basis are not reliable, or are misleading. It has been found practically impossible for the Board to obtain from the reports furnished by railways operating lines through the State, and within other States, reliable statistics that would enable it to determine the earnings of that part of the line operated in Iowa. Where the officers of the companies have attempted to give this information it has been upon a mileage basis of their entire lines regardless of population of territory or traffic carried.

In the *Annual Report of the Inspector of Finance of the State of Vermont, June 30, 1898*, it appears that the aggregate deposits in the savings banks and trust companies were \$84,071,721, an increase of \$1,471,094. The total number of deposit accounts was 108,511, of which 12,940 belong to non-residents. There were 2569 accounts of over \$1500 in the banks. Twenty-two savings banks paid 4 per cent interest, and one $3\frac{1}{2}$ per cent. The Inspector of Finance recommends that dividends be limited to $3\frac{1}{2}$ per cent until 15 per cent surplus has been accumulated.

MISCELLANEOUS.

At the National Convention of Charities and Corrections, held in New York in May, a committee was appointed to revise the national statistical blank which was originally prepared some ten years ago. This committee has now reported, and presents the following form:—

CAUSES WITHIN THE FAMILY.

- Disregard of family ties. (Desertion, neglect to contribute by children, brothers, sisters or other natural supporters.)
- Intemperance. (Abuse of stimulants or narcotics.)
- Dishonesty or other moral defects.
- Lack of thrift, industry or judgment.
- Physical or mental defects. (Blind, deaf, crippled from birth, insane, feeble-minded.)
- Sickness, accident or death.

CAUSES OUTSIDE THE FAMILY.

- Lack of employment not due to employé. (Changes in trade, introduction of machinery, hard times, strike or lockout, partial or complete shut-down, removal of industry, etc.)
- Defective sanitation.
- Degrading surroundings.
- Unwise philanthropy.
- Public calamity.

UNCLASSIFIED.

This form has fewer headings than its predecessor, and is regarded as more comprehensive. Lack of employment, due to the employé, and imprisonment, which is not a first cause, are omitted as causes of distress. Old age, large family, and no male support are omitted for the same reason. No heading is given for defective or misdirected education; this is regarded as too vague for practical use. Separate columns are provided for, showing chief causes and subsidiary causes. These new forms can be secured at cost from the New York Charity Organization Society.

Die Zahl im Kriege. Statistische Daten aus der neueren Kriegsgeschichte in graphischer Darstellung. By Otto Berndt. Publishers, Freytag and Berndt. Vienna, 1897. Pp. 174; folded map.

In these days of military interest this work will be of value not only for the reference library, but also for personal and immediate use. It is an attempt to show by diagrams the character of all the wars of this century, and the composition of the various armies engaged in the different campaigns and battles. The first part shows by a system of colored squares the exact years in which the several countries of Europe have been engaged in war during this century. For example, Austria-Hungary has had 17 years of war and 79 years of peace. Under each one of these checkered squares is given a list of the most important dates connected with these war periods. This is followed by a comparative table of the years of war and peace of the several countries of Europe arranged side by side. Here it is seen, for example, that Turkey has had 37 years of war, Spain 31, France 27, Russia 24, Italy 23, and England 21. These exclude the minor wars. The second part presents diagrams showing the relative strength of armies by a series of rectangles of various colors. Diagrams also show the number of killed and wounded in the several battles. Another part presents maps showing the lines of march of the armies in the great campaigns.

A Statistical Account of the Seven Colonies of Australasia, 1897-98. T. A. Coghlan, Government Statistician of New South Wales. Seventh issue. Sydney, 1898. Pp. xiii, 543.

This useful compendium is of great value, as not only showing the present state and resources of the Australasian colonies, but also because of the comparisons afforded in the experience of different groups

of English speaking people, which can be used for sociological illustrations. The editor declares that the conditions of life are more favorable in Australasia than in any other country. The excess of births over deaths is somewhat less than 19 per 1000. For the United Kingdom it is a little over 11 per 1000. Over 95 per cent of the population of the seven colonies are of British or Irish birth or descent, excluding the Chinese, who are not permanent settlers. Among the different topics considered are population, religion, education, social condition, commerce, railways, food supply, cost of living, and finance.

The Bureau of Statistics of Labor has published, pp. 1-192, vol. 3, of the *State Census of Massachusetts, 1895*. This volume is devoted to parent nativity. A brief summary shows that the percentage of the total population represented by persons of wholly native parentage in 1885 was 44.05; in 1895 it had become 38.23. The percentage of the population of wholly foreign parentage in 1885 was 47.86; in 1895 it had risen to 51.93. The persons having one parent native and one foreign comprised 6.17 per cent in 1885, and 8.13 in 1895. There is a small margin unknown. There are exhaustive tables showing the parent nativity by States and countries, and a special study is made of the parent nativity of persons 90 years of age and over.

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CONTRIBUTIONS TO THE HISTORY OF WAGE STATISTICS.¹

BY CHARLES J. BULLOCK.

I. UNOFFICIAL INVESTIGATIONS OF THE STATISTICS OF WAGES.

The earliest attempts to present information relating to wages were altogether unofficial in character; and consisted either of conjectural estimates concerning national income and its division, or of simple statements of wage rates in given occupations at definite times. Of the first class, Gregory King's "Scheme of the Income and Expence of the several Families of England, calculated for the Year 1688" may serve as an early example.² Of the second class, the data given in Adam Smith's "Wealth of Nations are Typical."³

In the economic and statistical literature of the present century considerable attention has been devoted to the collection of data relating to the earnings and condition of

¹ The materials for this article were gathered during the course of an investigation which the writer was requested to make concerning the federal census and wage statistics. They are now published as a mere contribution to the history of wage statistics, in the hope that they may be of some value to workers in that field. The writer regrets that the publications of the various state labor bureaus could not be given more adequate treatment, but it was impossible under the circumstances to describe the work done in most of the states.

² Gregory King's *Natural and Political Observations upon the State and Condition of England* was reprinted by George Chalmers, 1810. The table in question may be found in Charles D'Avenant's *Works*, ii, 184 (London, 1771).

³ J. E. T. Rogers's edition, i, 73, 78, 80, 81, 108, 109.

wage-earners. Census statistics, probate records, returns of income taxes in various countries, statistics of the tax on rentals in Paris, and other sources of a similar nature have been drawn upon for information concerning the distribution of income among the various social classes; while quotations of actual or average wages have been sought with increasing assiduity. Unofficial investigations may still be divided into two classes, which, in some measure, resemble the earlier writings upon the subject of wages.

In the first class may be placed the writers who not only study statistics of wages, but also attempt to form estimates of the aggregate or relative incomes of various social classes. Of English writers, we may mention Dudley Baxter, Leone Levi, and Robert Giffen.¹ While they present large collections of statistical data concerning wages, these writers pass beyond the sphere of the collection and presentation of ascertained facts. Among French writers, Leroy-Beaulieu must be included in this class.² In the United States, Mr. Charles B. Spahr should be mentioned.³

The writers of the other class confine themselves more strictly to the ascertainment of statistics of wages, and have industriously collected a considerable body of such data.⁴ Tooke and Newmarch, as well as Porter, published a large amount of material concerning English wages;⁵ while the monumental work of Thorold Rogers will long remain a leading source of information.⁶ More recently Charles Booth's

¹ R. Dudley Baxter : *The National Income* (London, 1868). L. Levi : *Wages and Earnings of the Working Classes* (London, 1885). R. Giffen : *Progress of the Working Classes*, in his *Essays in Finance*. Second Series (London, 1887).

² P. Leroy-Beaulieu : *Essai sur la répartition des richesses*, chaps. 16 and 19 (Paris, 1881). See also a writer in the *Journal de la société de statistique de Paris*, 1890, 225-240.

³ Charles B. Spahr : *The Present Distribution of Wealth in the United States*, especially 119-129 (New York, 1896.)

⁴ We shall not consider the "individual monographs" prepared by Le Play and his followers. These contain much information concerning family earnings, but the materials are in such a form as to make statistical comparison and classification a work of extreme difficulty.

⁵ Thomas Tooke and William Newmarch : *History of Prices (1837-1857)*. G. R. Porter : *Progress of the Nation*, II, 122, 243, 264 (1838).

⁶ J. E. T. Rogers : *History of Agriculture and Prices in England (1866-1887)*.

investigations have furnished a mass of wage statistics for the city of London.¹ Of the various unofficial studies concerning comparative wages in England at different periods, a careful discussion by Mr. A. L. Bowley should perhaps be accorded the highest rank.² In France, we should mention the well-known work by Chevalier upon wages in the present century.³ In Germany, von der Goltz has studied the wages of agricultural laborers.⁴ Since 1880 some of the German labor unions have collected, more or less systematically, statistics of wages.⁵ Careful, detailed studies of wage statistics in particular trades and localities have been made by Bauer and Schullern-Schrattenhofen;⁶ while a cursory glance at the statistical and economic journals shows a number of other investigations.⁷ In recent years official statistics, collected in accordance with the law for sick insurance, have yielded data that have been utilized by Lange and Hirschberg.⁸

Concerning the methods employed by the first class of writers it may be said that, in the present condition of statistical science, trustworthy data are lacking for any exact computations of the aggregate incomes of the various social classes. On this point only the most uncertain estimates are possible. Such economists as Giffen and Leroy-Beaulieu have certainly presented much valuable statistical information concerning both nominal and real wages, but it cannot

¹ *Labour and Life of the People* (1889-1897).

² A. L. Bowley : *Changes in Average Wages in the United Kingdom between 1880 and 1891*, in *Journal of Royal Statistical Society*, lviii, 223-285.

³ E. Chevalier : *Les Salaires au xix siècle* (1887). Scattered data of wages in various countries may be found in the *Journal de la société de statistique de Paris*. See Index, 1860-1880.

⁴ *Die ländliche Arbeiterfrage*. Second edition (1884).

⁵ See extract from the *Vossische Zeitung*, published in U. S. Consular Reports, xli, 70-71.

⁶ See Bauer, in *Jahrbücher für Nationalökonomie und Statistik*, lxvii, 839. Schullern-Schrattenhofen, in *Zeitschrift für Volkswirtschaft, Socialpolitik, und Verwaltung*, v, 1-61.

⁷ See *Zeitschrift des preussischen statistischen Bureaus*, 1868, pp. 326-351 ; 1875, pp. 391-401 ; 1876, pp. 235-239. See also *Jahrbücher für Nationalökonomie und Statistik*, xviii, 125-147 ; xlvii, 160-169 ; lix, 97-116. For Holland, see reference to article published by Dutch Statistical Institute in 1886, in *Quarterly Journal of Economics*, vi, 155.

⁸ E. Lange, in *Archiv für soziale Gesetzgebung und Statistik*, vi, 1-13. E. Hirschberg, in *Jahrbücher für Nationalökonomie und Statistik*, xlv, 263-271 ; lxi, 870-877 ; lxii, 740-746.

be said that any great degree of certainty attaches to their conclusions concerning the relative incomes of social classes. Of the investigations of the second class it can not be claimed that all possess equal value. Some of the wage statistics here presented are evidently mere averages, gathered sometimes in an uncritical manner. But others are actual quotations of wages, which have been carefully classified and worked into such a form that they are useful for statistical purposes. The investigations of Bauer and Schullern-Schratzenhofen are pre-eminently of this character. Also the paper by A. L. Bowley is noteworthy as a careful attempt to select data that shall be fairly comparable, and shall throw light upon the course of English wages during a period of thirty years. Enough has been accomplished by such unofficial investigations to show the erroneous character of Meitzen's opinion¹ that wages "are susceptible only of estimate."

II. OFFICIAL INVESTIGATIONS OF WAGE STATISTICS IN FOREIGN COUNTRIES.

The necessary field of wage statistics is so broad that there can be little doubt of the insufficiency of private investigations by economists and statisticians. Accordingly various governments have undertaken the collection of data relating to work and wages. In this department American investigators have less to learn from European examples than in many other branches of statistical science. Nowhere have official statistics of wages been more fully developed than in the United States. European censuses differ in scope from our own, and have generally paid no attention to wage statistics; while, in the establishment of bureaus of labor statistics, this country has led the way. Yet the earliest official wage statistics that possess any scientific value are to be found in Belgium.

In that country a census of industrial statistics, including the subject of wages, was taken in 1846. This investigation

¹ A. Meitzen: *History, Theory, and Technique of Statistics*, translated by Falkner, 188 (Philadelphia, 1891).

was under the administration of the great Quételet, and contained many noteworthy features.¹ Some of these deserve detailed consideration.

The census included only those laborers who worked in factories and shops, and excluded domestic workers. Such a narrowing of the field of inquiry added greatly to the value of the results, since the best industrial statistics are gathered in the large industries. Then great care was taken in the reduction of quotations of piece wages. Reports were secured concerning the wages of 317,812 hired laborers, and the returns were thoroughly classified according to the age and sex of the workers. Further than this, the adult workers and the children were separately graded according to the daily wages received, the grades varying from a daily wage of fifty centimes or less up to wages of five francs or more. Thus the census presented a valuable body of wage statistics, classified according to the age and sex of the laborers as well as the daily rates of wages.

It was not until 1880 that an attempt was made to repeat the investigation conducted so successfully by Quételet. In that year another inquiry was made;² but, unfortunately, the methods and scope were so different from those of the earlier census that the two bodies of statistics are partly, if not wholly, incomparable. In 1880 reports were secured concerning 384,069 laborers, but these were all in large industries, workers in shops being excluded. This omission of the shop workers, included in 1846, may have improved the quality of the statistics collected in 1880; but it makes comparisons of the two investigations difficult. But, more than this, the later inquiry has a different classification of industries, and a different classification of workers by ages. Finally, the census of 1880 failed to classify the laborers by sexes, so that the returns secured have far less value than they might have possessed.

¹ An account of this census may be found in the *Bulletin de l'institut international de statistique*, 1892, part 1, 73-74.

² *Bulletin de l'institut international de statistique*, 1892, part 1, 74-78.

Statistics of agricultural wages were collected in Belgium in 1846, 1856, 1866, and 1880. The last inquiry groups the wages paid by districts. In 1888 a commission of labor gathered some information concerning wages and family budgets, but the results were incomplete and lacked uniformity.¹ This is the usual result of investigations conducted by a commission that attempts to call witnesses, and to gather wage statistics from the testimony secured in this manner. American statisticians may congratulate themselves that such methods have been more favored in Europe than in this country.

Until the last ten or twelve years, European countries, with the exception of Belgium, seem to have accomplished but little in the collection of wage statistics. Inquiries by commissions seldom produced even satisfactory materials for investigation, and the results achieved can hardly be dignified with the name "statistics." The English Board of Trade had published data upon wages that had been based upon returns from local chambers of commerce.² But such reports left much to be desired. In 1886, however, an increased interest in labor statistics began to be shown by the establishment of official bureaus for the study of topics relating to labor. This was seventeen years after the formation of the first state labor bureau in the United States, and two years after the passage of the act for the establishment of the United States Department of Labor.

A labor correspondent was added to the English Board of Trade in 1886, and several reports upon labor topics were issued during the next few years.³ One of the first tasks undertaken was the compilation in a single volume of all the

¹ These results were reprinted by the English Board of Trade. See *Parliamentary Papers*, c. 5269 of 1888.

² See *Parliamentary Papers*, c. 5172 of 1887, p. i.

³ Upon the Labor Department of the Board of Trade see D. A. Schloss, in *Journal of Royal Statistical Society*, lvi, 44-61; Palgrave, *Dictionary of Political Economy*, ii, 519-520; *Quarterly Journal of Economics*, i, 376-377, vii, 360-362; *Journal of Royal Statistical Society*, lvi, 330-332; *Bulletin de l'institut international de statistique*, 1887, part i, 179; 1886, part ii, 244.

wage statistics scattered through the English blue books.¹ But inadequate provisions were made for the work of the correspondent. The staff of the office was inadequate, and small appropriations made it impossible to collect materials in any way except by sending out letters of inquiry, — a method which the experience of all countries has shown to be unsatisfactory if it is desired to secure a large body of accurate data. In 1898, therefore, it was necessary to re-organize the work; and the Labor Department was formally established. More liberal appropriations have made it possible to employ trained agents in gathering the statistics, and a series of important reports has appeared. In the work of the Labor Department in the field of wage statistics a strong feature is the careful classification of wages actually paid, that will in time furnish a large mass of comparable data of the highest importance.

Of the present publications of the Labor Department the student of statistics will be most interested in the reports upon yearly changes in rates of wages and hours of labor in the United Kingdom. For this purpose materials are gathered from many sources, and carefully sifted, verified, and criticized. In doubtful cases special agents make investigations. A "change in wages" is defined² as "a change in the weekly or hourly rate of remuneration of a certain class of workpeople, apart from any change in the nature of the work performed." Thus the Department attempts very properly to exclude, as confusing and misleading, the following cases: (1) Changes in average earnings of a trade, due not to altered rates, but merely to accidental changes in the proportions of higher and lower skilled workmen. (2) Changes due to promotion of a laborer, or to his degradation to a lower class of work. (3) Seasonal changes, regularly occurring in some trades at certain seasons, in which a lower wage is accompa-

¹ A list of the publications of the Labor Department is given in Palgrave, *Dictionary of Political Economy*, II, 519-520.

² See *Parliamentary Papers*, c. 8075 for 1896, pp. x-xi. On the methods and results of these reports, see also *Parliamentary Papers*, c. 7567 for 1894.

nied by a proportional change in the hours of labor. (4) Changes in terms of employment, providing for extra compensation for extra work, and *vice versa*. From these data the department can compute the number of separate individuals whose wages are raised or lowered during the year, and the amounts of such changes. For 1894 and subsequent years the investigations have included even rates of agricultural wages.

In Switzerland, provision was made for the *Secrétariat Ouvrier Suisse* in September, 1886; and work was commenced the following year.¹

In France, wage statistics were published annually by the government,² but these were made up from schedules sent out to the various prefects who filled them with mere estimates of wages, often of a purely conjectural character.³ In the year 1891, however, an "*Office du Travail*" was established, and more adequate provision was made for labor statistics.⁴ The office has, as a rule, employed special agents; and has sent them to the establishments where materials were to be sought. At first there was manifested a tendency to overload the schedules, which comprised seven pages of questions relating to wages, etc. But, following the example of American bureaus, the number of questions has been reduced.⁵ In 1897 the office completed a large work in four volumes, containing statistics of wages and prices from 1840 to the year of publication.⁶ During this period of more than half a century wages appear to have doubled, and a part of the increase has occurred since the year 1878, when the

¹ Handwörterbuch der Staatswissenschaften, Supplementband, I, 146; *Bulletin de l'institut international de statistique*, 1886, part II, 244; *Bulletin of United States Department of Labor*, I, 108.

² See *Annuaire statistique de la France*, 1887, pp. 403-410; 1888, pp. 273-286; 1889, pp. 221-264; 1890, pp. 213-264.

³ Bertillon: *Cours de statistique*, 323.

⁴ Handwörterbuch der Staatswissenschaften, Supplementband, I, 146; Bertillon: *Cours de statistique*, 320; *Economic Journal*, II, 385-387; *Journal des Economistes*, fifth series, VII, 249, 315, 316.

⁵ Bertillon: *Cours de statistique*, 321-323.

⁶ This report has been reviewed at length in the *Quarterly Journal of Economics*, XIII, 106-109.

great fall of prices commenced. The results of this report are conveniently summarized in a series of index numbers.

The year 1894 saw the establishment of labor bureaus in Belgium and in Spain.¹ In the former country this action had been preceded by the appointment of a superior council of labor for the investigation of various labor problems.

In other European countries, the establishment of labor departments has been urged at times, but such projects have not been carried out. In Germany, the lack of any systematic official returns concerning wages has often been regretted, and plans for the collection of wage statistics have been formulated. Von Meyr has urged that this work should be conducted by the office of labor insurance, while von Scheel thinks that the task would best be intrusted to the present statistical office of the Empire.² A single investigation concerning wages in Berlin was undertaken by the statistical office of Berlin in 1887, and a somewhat similar inquiry was made in Breslau at about the same time.³ In 1892 there was organized a Commission for Labor Statistics, composed of public officials and delegates from the Reichstag. This body, which is far from being an independent statistical bureau, has held several inquiries, and has taken testimony concerning various labor questions. Since it can not extend such an examination to all institutions of a given class, it is necessary to deal only with cases that are deemed fairly typical. Upon the basis of the evidence thus gathered, the Commission formulates plans and recommendations for regulating industry. It has nothing to do, however, with the technical

¹ *Bulletin de l'institut international de statistique*, 1895, part II, 224; *Handwörterbuch der Staatswissenschaften*, Supplementband, I, 146.

² On this discussion see *Handwörterbuch der Staatswissenschaften*, Supplementband, I, 146-148; *Allgemeines statistisches Archiv*, II, 133, 142, 228, 229, III, 320, 321; K. Frankenstein, *Zur Organisation der amtlichen Lohnstatistik im Deutschen Reiche* (1899); *Archiv für soziale Gesetzgebung*, III, 700, 701.

³ *Archiv für soziale Gesetzgebung und Statistik*, III, 196-205; *Journal of Royal Statistical Society*, II, 823-826.

details of tabulating and publishing the results of the inquiries. This work is done by the Imperial Statistical Bureau.¹

In Austria little has been accomplished in the collection of official wage statistics. The need of such work was strongly urged by Inama-Sternegg in 1892;² and two years later a plan for a bureau of labor statistics, with strictly limited powers, was brought forward.³ The scheme seems to have encountered strong opposition from privileged classes, and to have failed of adoption. Perhaps the nature of this opposition was reflected in the requirement that the proposed labor office should not investigate the industries of agriculture, forestry, or mining. In 1895, however, there appeared a report upon agricultural wages in Austria.⁴ This inquiry was instituted by the Ministry of Agriculture, and the returns were edited by Inama-Sternegg. Information was secured by sending written questions into various districts, and then compiling and digesting the answers thus received.⁵

In Denmark, investigations into wages were conducted in 1872 and 1882. These inquiries were directed by the Ministry of the Interior, and by the Statistical Bureau of Copenhagen, but the results were not at all noteworthy.⁶ In Italy, also, two attempts have been made to secure statistics of wages, and the results have been published by the Director of Statistics.⁷ But no department of labor statistics has been established.

¹ See *Handwörterbuch der Staatswissenschaften*, Supplementband, I, 146, 147; *Archiv für sociale Gesetzgebung und Statistik*, v, 146; *Bulletin of United States Department of Labor*, I, 108. The reports of the German Commission have been summarized in the *United States Labor Bulletin*, I, 400-411; III, 73-75. See also *Publications of American Statistical Association*, III, 213-219.

² *Statistische Monatschrift*, 1892, 113-128.

³ *Archiv für sociale Gesetzgebung und Statistik*, VII, 306-316.

⁴ *Journal of Royal Statistical Society*, LVIII, 650-651; *Zeitschrift für Volkswirtschaft, Socialpolitik, und Verwaltung*, v, 1-61.

⁵ Upon October 1, 1896, a Bureau of Labor Statistics was established in Austria, in accordance with an imperial decree of the previous July. The object of this office is a "systematic collection and preparation of statistical data relating to labor." See the *Quarterly Journal of Economics*, XLII, 230-231.

⁶ *Bulletin de l'institut international de statistique*, 1892, part I, 195-199.

⁷ L. Bodio: in *Annali di Statistica*; Fourth Series, 14 and 26. *Quarterly Journal of Economics*, VI, 153-154, 188. *Statistische Monatschrift*, XV, 339.

In Canada and Australasia, official statistics of wages have been published.

The Canadian census has investigated manufacturing industries in much the same way as the United States census. In 1891 returns were secured from 75,968 establishments, employing 370,256 hands.¹ These hands included 278,424 men and 96,832 women and children. Ascertaining the total wages paid, the census takes as a divisor the number of hands employed, and arrives at an average rate of wages. The Statistical Year-Book shows the results by provinces. As a rule, a substantial increase appears when the returns for 1890 are compared with those for 1880. But the Canadian statisticians do not approach our own census takers in ability to figure out higher rates of wages. In one province the Canadian census showed an increase of only one dollar, while in the Northwest Territories a decrease of twenty dollars was shown. These results are very tame when compared with those achieved in the Eleventh Census of the United States. Besides the Canadian census, mention should be made of the Reports of the Bureau of Industries of the Province of Ontario. These have appeared since 1883, and have been included in the Report of the Ontario Department of Agriculture since 1887. They have investigated especially the wages received by farm laborers and domestic servants, but have included other kinds of laborers.² The classified presentation of rates of weekly wages has been employed extensively.

In New Zealand, official statistics of wages are found as early as 1882. They have been continued from year to year, and now give average rates of wages in various trades, classified by districts.³ The Year-Book of Victoria gives

¹ Census of Canada, 1890-1891, III (Ottawa, 1893). See also the Statistical Year-Book of Canada, 1896, pp. 198, 202, 206, 212, 216, 219, 223, 229, 232, 236, and especially 237.

² See *Quarterly Journal of Economics*, vi, 170, 171. *Bulletin of the United States Department of Labor*, I, 291-294; II, 614-615. Davidson: *The Bargain Theory of Wages*, 210-212.

³ *Statistics of the Colony of New Zealand*, 1896, pp. 241-242. The writer has been unable to secure publications prior to the year 1882.

average rates of wages paid in Melbourne.¹ These tables present merely maximum and minimum rates, which show wide differences. Hence they might show no change even if the wages paid to the majority of laborers should alter, for they do not give the number of hands employed at specified rates of wages. The Year-Book for 1891 gives similar data that reach back to 1880.

In New South Wales, T. A. Coghlan has published interesting tables of weekly wages, classified by occupations and sub-divisions of occupations.² The reports show the maximum and minimum rates of payment in each case, and appear to be actual quotations, not averages; but the tables do not show the number of hands employed at each rate. This is a serious omission, for great differences are shown between the highest and lowest wages paid. In another work³ Mr. Coghlan gives a large body of wage statistics that reach back even as far as 1828. Among other things, a table of classified weekly wages from 1872 to 1886 is presented for thirty-two different occupations; while much information is given concerning prices and the cost of living.⁴

III. OFFICIAL INVESTIGATIONS OF WAGES IN THE UNITED STATES.⁵

As is well known, the various labor bureaus in the United States have conducted many investigations into the statistics of wages. The Reports of the Massachusetts Bureau of Labor contain from the outset data relating to this subject. We may begin with the Report for 1882, which gave average weekly wages, classified by occupations, for the years 1860, 1872, 1878, and 1881.⁶ In 1883 the Report covered the

¹ Year-Book of Victoria, 1894, pp. 571-574.

² New South Wales Statistical Register, 1896, pp. 504-514.

³ Wealth and Progress of New South Wales, Tenth Issue, 1896, pp. 422, 432-433, 441-442, 452-453, 458-459, 467, 471-472, 476-477, 479, 480.

⁴ Wealth and Progress of New South Wales, 467, 480-483.

⁵ In this article no mention will be made of statistics of wages in the federal census. That subject has been treated by the writer in the *Publications of the American Economic Association* (1899).

⁶ Of the earlier Reports see those for the years 1874, 1876, and 1879.

wages paid and the average number of hands employed in eighty industries.

In the next year an attempt was made to ascertain the average rate of wages in Massachusetts, and to compare this rate with the wages paid in Great Britain. Returns were secured of the wages of 85,900 laborers in Massachusetts.¹ These formed about ten per cent of the employees of the twenty-four industries that showed a product equal to seventy-five per cent of the total industrial product of the state. Quotations were gathered from pay-rolls by agents of the Bureau, and the wages were classified according to the age and sex of the laborers. The method employed in computing the average wages was as follows. First, the bureau ascertained the average wages in each sub-division of each occupation, excluding unusually high or low quotations. Thus a valuable average of the wages paid to a group of laborers of nearly the same grade of skill was secured. Second, the Report determined the average weekly wages of all men, of all women, and of all children, in each industry. Such averages are less useful, since by averaging the wages of all the men or women in each industry we average the wages of all grades of labor, skilled and unskilled; and the result may be an average that is wholly unreal, not representing the actual wages paid to any considerable number of operatives. When wages varying from \$6.00 to \$30.00 per week are averaged, as was done in the cotton industry, the result is not likely to represent the actual earnings of the mass of the laborers included. In the worsted industry the wages varied from \$3.00 to \$38.40. In the third place, the Report combined these average wages of men, of women, and of children, and computed the average weekly wage for each industry. Such a procedure resulted in an average that was almost useless, if not actually misleading. Of course these averages were highest in those trades where the smallest number of women and children were employed. The build-

¹ This Report has been carefully criticized in the *Political Science Quarterly*, 1, 71-73.

ing trades showed an average of \$14.99, and the cotton manufacture one of \$6.45. In the first industry only men were employed; while in the second there were 1728 men and 5788 women and children. The average wage of \$6.45, reported for the cotton industry, can, manifestly, give no certain information concerning the earnings of men employed at such work. Finally, the wages in each industry were combined into an average weekly wage for all industries, and the resulting average was then compared with the English wage statistics. The average weekly wages were stated as \$10.31 for Massachusetts and \$5.86 for Great Britain. Such a combination of averages of the wages of men, women, and children was most unfortunate.¹ But the Report made other comparisons that were of more value. Perhaps the most interesting of these was a table showing the number of occupations in each country paying each rate of weekly wages.² This table separated men, women, and children. From it one can see at a glance that about ninety per cent of the occupations in which men are engaged in Great Britain pay less than \$10.00 per week, while more than sixty per cent of such occupations in Massachusetts pay over \$10.00 per week.

The Report of the Bureau for 1885 gave a historical review of wages from 1752 to 1860. But this must be passed over in order to speak of the investigations conducted in connection with the state census of 1885.³ This census made extensive inquiries into wages and earnings, and investigated the relation of wages to the cost of production. The total wages paid and the total number of employees were ascertained, and an average wage of \$351.02 for the entire state was computed.⁴ The number of hands enumerated was the total number present at any time during the year,

¹ Mr. Wright defended this use of averages in an article in the *Quarterly Journal of Economics*, vi, 178-179.

² See pp. 306-308, Report for 1884.

³ Census of Massachusetts, 1885, vol. II, Manufactures, Fisheries, and Commerce.

⁴ Census of 1885, vol. II, p. ci.

not the average number employed. But the valuable feature of the census was the table of classified weekly wages.¹ These returns may be conveniently studied in the Report of the Labor Bureau for 1889. Here one finds returns of the weekly wages actually paid to 248,200 employees, nearly two-thirds of the total number engaged in manufacturing and mechanical pursuits.² The results are well classified,—(1) by industries; (2) by the sex of the employees; (3) by the amounts of weekly wages received. These tables then show: (1) the number of males and females receiving each specified rate of wages, from \$5.00 and less up to \$20.00 and over; (2) the per cent this number bears to the whole number of laborers for whom returns were received. The data thus presented would have a greater value for statistical purposes if the classification had distinguished between the wages of children and of adults. We are told³ that a large proportion of those males who receive less than \$7.00 per week are minors, and that many of the females that receive less than \$5.00 per week are minors. But this is not sufficient for purposes of exact comparison between wages in one industry and those paid in another. The Report on Manufactures⁴ shows the ages of the persons employed in each industry. By combining these data, with the classified wage tables, the careful student can make available a large mass of valuable wage statistics.

In 1886 annual statistics of manufactures were authorized, in order to secure the prompt publication of simple and comparable data concerning the principal industries of the state. It was desired also to guard against possible errors in comparisons drawn from decennial censuses, some of which are likely to be taken in abnormal years. The annual Reports on Manufactures have contained much information of interest to the student of wage statistics. The most valuable features

¹ See especially census for 1885, II, pp. cii-civ.

² Report of Bureau of Statistics of Labor, 1889, 410-430.

³ Report of Bureau of Statistics of Labor, 1889, 432.

⁴ Vol. II, 1086-1089.

from this point of view have been the tables of classified weekly wages, constructed upon a plan similar to that adopted in the census of 1885. The continued publication of such data year after year will surely build up a mass of incontrovertible facts concerning the course of wages in Massachusetts. Of much less value are the tables presenting the average annual earnings of all the employees in each industry, and in all industries.

Important statistics have been published in the Reports of the Bureau of Statistics of Labor since 1889. Chief among these is the Report for 1895, which presents tables of graded weekly wages, gathered from many different publications. Besides the reports of labor bureaus in other states, the United States census of 1880 and the consular reports of the United States have been drawn upon. In all, 430,900 wage quotations are given. In examining the Report one is struck by the fact that the materials presented are of very unequal value. In particular, it seems unfortunate that the Massachusetts Bureau should have utilized, in comparative tables, data taken from reports by our consuls. In 1896 the Report of the Bureau continued these tables of graded weekly wages, and also published data relating to wages paid in 1891. The Report for 1897 contains an investigation of comparative wages and prices for the years 1860, 1872, 1878, 1881, and 1897.¹ Particular comparisons are made of wages paid in 1872, 1881, and 1897. For this purpose the average rate of wages is computed for each industry, the quotations for each branch of employment being given an importance proportionate to the percentage which the number of persons so occupied bears to the total number engaged in the entire industry. Between 1872 and 1897 seven industries show a decrease in money wages, and four show an increase. Between 1881 and 1897 eight industries show a decrease, and fifteen show an increase. The results vary widely in the different industries. Between 1872 and 1897,

¹ Twenty-Eighth Annual Report of the Bureau of Labor Statistics, 1-42.

for instance, the variation ranges from a decrease of 21.97 per cent up to an increase of 68.92 per cent. Between 1881 and 1897 the maximum variation is from a decrease of 34.47 per cent up to an increase of 43.91 per cent. Such wide differences in the results justify a doubt whether the statistics are based upon observations sufficiently numerous to support a valid average for the entire manufacturing industry of the State. In two instances the results are somewhat peculiar. The wages of agricultural laborers who were furnished with board increased 2.78 per cent; while the remuneration of similar laborers whose wages did not include board decreased 8.76 per cent. Does this willingness of farm laborers to accept lower wages, when food and lodging are not included, indicate a progressive deterioration in the quality of the hired man's board since the Crime of 1873?

During the last year the state census for 1895 has been published. This included an investigation into the average wages paid in manufacturing industries. It ascertained the average, the smallest, and the largest number of hands employed during the census year. Then it divided the total amount paid in wages by the average number of employees, and computed an average wage of \$446.41.¹ In a similar computation the census of 1885 used as a divisor the total number of hands employed at any time during the year, and computed an average wage of \$351.02. Of course the results of the two censuses are, for this reason, wholly incomparable; and, accordingly, the last census undertakes to make no comparison. The reader is wisely cautioned against attaching much importance to averages computed for a large body of laborers of different sexes and ages, as well as of different grades of skill; but it is unfortunate that persons who exploit official statistics are not expressly informed that no comparison can be made between the average rates of wages calculated in 1885 and those computed in 1895. In the absence of such a warning Mr. Michael Mulhall is almost

¹ Census of Massachusetts, 1895, v, 235, 240, 280.

certain to appear with a declaration that official statistics prove that wages in Massachusetts increased from \$851 to \$446 during the decade ending in 1895.

Of the work of the labor bureaus of other states much might be said,¹ especially in the case of the earlier reports of the Connecticut Bureau. The Connecticut Report for 1888 gives an interesting table of yearly earnings of various classes of employees grouped by industries. The number of quotations is fairly large, and the classified results are of much interest. It presents, also, statistics of classified wages paid during the last week of June, 1887. The data for the Report were secured by special agents of the bureau. The reports of recent years² have contained statistics of manufactures, and have deduced average yearly earnings of laborers from data concerning total wages paid and the number of hands employed. In 1896 there was published a table showing the highest and lowest wages paid in each industry to men, women, boys, and girls.³ These statistics illustrate well the unreal and misleading character of an average wage, even for all men in the same industry. In one instance the daily wages paid to men varied from a minimum of \$0.50 to a maximum of \$6.00. Finally, the Report for 1897 gives the results of an investigation into the condition of workingmen. It was based upon returns secured from 200 laborers, divided into seven groups "of as nearly the same degree of efficiency and capacity for earnings as was considered to be the average throughout the State."⁴ But almost every group showed the widest differences in the earnings of its members.

In a number of other states the use of tables of classified weekly wages has been introduced.⁵ A continuation of this

¹ *E. g.*, see *Political Science Quarterly*, 1, 66-83; *Quarterly Journal of Economics*, vi, 164-183.

² See Report of Connecticut Bureau of Labor Statistics, 1896, 293, 294, 295, 306, 307.

³ See p. 306.

⁴ See p. 20.

⁵ Report of New Jersey Bureau of Statistics, 1896, 82-96; Report of Illinois Bureau, 1892, 156-234; Report of Wisconsin Bureau, 1896, 360-361.

method of presenting results will gradually furnish us with a large body of comparable wage statistics.

The United States Department of Labor was established by a law approved June 27, 1884. Its annual reports have contained many special investigations into wage statistics. It is not necessary to attempt any summary of these publications¹, but it is desirable to emphasize two features of the work of the Department of Labor. The investigations have been conducted by trained special agents; and wage statistics, whenever presented, have been classified with care, so that useful data have been secured.

Besides the publications of the Department of Labor, various other investigations into wage statistics have been conducted under the authority of the United States government. In 1875 Edward Young submitted a special report upon "Labor in Europe and America." In 1879 and 1885 there appeared two series of reports by American consuls upon wages in foreign countries.² The materials here presented, even when they may be considered trustworthy in themselves, are a mass of incomparable data which are of little value for statistical purposes. Yet it should be said that in Mr. Young's report, and in those of some of the American consuls, much honest and trustworthy material may be found.

In 1882, upon the request of Congress, Mr. Joseph Nimmo prepared a report upon wages in the United States and in other countries.³ This document is remarkable for what Mr. Nimmo carefully refrained from doing. He frankly stated that his materials were not satisfactory, and that he could not undertake any extensive comparisons of American and foreign wages, because comparable data could not be secured

¹ See especially the Fourth Report for "classified yearly earnings" of working women in cities; the Fifth Report for statistics of "time and earnings of railway employees," with most elaborate classifications; the Eleventh Report on work and wages of men, women, and children in the same occupations.

² *The State of Labor in Europe* (Washington, 1879); *Labor in Foreign Countries* (Washington, 1885).

³ *Comparative Rates of Wages in the United States and in Foreign Countries. Miscellaneous Publications of Treasury Bureau of Statistics* (Washington, 1882).

for that purpose. Such self-restraint upon the part of an official statistician, who had the resources of the government printing office at his command, is certainly worthy of passing notice.

In 1892 the statistician of the Department of Agriculture published the results of an investigation into the wages of farm labor in the United States.¹ The statistics were most complete from 1866 to 1892, although some quotations reached back to the year 1840. They are based upon an extensive system of averaging that was described as "very consistent, and in a high degree trustworthy and convincing." In the case of farm wages, where greater uniformity prevails than in the wages of factory operatives, such a use of averages may be admissible. The investigation showed high rates of (currency) wages after the Civil War, followed by a decline that reached its lowest point in 1879. Then wages seem to have risen to "a normal status, which has been maintained with wonderful uniformity during the last ten years."

Perhaps our best known and most widely quoted collection of official wage statistics is the Aldrich Report on "Wholesale Prices, Wages, and Transportation," published in 1893.² This contains an investigation into wages in the United States from 1840 to 1891. The Report states that these statistics represent "twenty-two more or less distinct industries,"³ and it presents data gathered from eighty-eight establishments. "The wages in January, 1860, are taken as the basis, and subsequent wages are calculated as percentages of the same."⁴ In this manner there were secured tables of relative wages in each industry, and the average wages for all industries during the period in question.⁵ The simple average for all industries showed an increase in wages

¹ J. E. Dodge : *Wages of Farm Labor in the United States, 1840-1892*. Reports of Division of Statistics, Miscellaneous Series, No. 4 (Washington, 1892).

² Senate Report 1394, 52nd Congress, 2nd Session (Washington, 1893).

³ This was a misprint obviously, for the tables show that 21 industries were investigated. See Report, I, 172-174.

⁴ Report, I, 110.

⁵ Report, I, 111-177.

amounting to 60.7 per cent from 1860 to 1891, while a weighted average indicated an increase of 68.6 per cent. Between 1880 and 1891, the simple average for all industries showed an increase in relative wages from 141.5 to 160.7; while the weighted average gave an increase from 148 to 168.6.

The Report includes, also, some statistics gathered by Mr. J. D. Weeks for the coal, iron, glass, and pottery industries.¹ These data were collected by a somewhat different method, and consequently were not averaged with the statistics first mentioned. It is claimed, however, that they "conform in the main with the results of the general investigation into wages."² It is true that Mr. Weeks's statistics show, in most cases, a material increase in wages since 1860; and, to that extent, confirm the results of the Report. But, from 1880 to 1891, Mr. Weeks's figures show practically no increase in wages;³ while the Report indicates a very material increase for this period of eleven years.

The Report does not include any investigation into the wages of farm laborers. Efforts were made to secure such data from Mr. Dodge, who had published in 1892 the results of his inquiries upon this subject; but it was found to be impossible to secure enough quotations for any data prior to 1866. This was unfortunate, for Mr. Dodge's statistics of farm wages from 1866 to 1891 do not conform to the results indicated for the industries covered by the Aldrich Report. Mr. Dodge showed that farm wages had remained practically stationary since 1882, and that gold wages were about the same in 1892 as they had been in 1866.⁴

The Aldrich Report gathered statistics concerning 21 industries. But in four of these the quotations were not used for various reasons.⁵ In the 17 industries finally used as the

¹ Report, I, 181-184.

² Report, I, 184.

³ Following the same methods of averaging that are used in the Report, Mr. Weeks's data show relative wages of 156.2 in 1880, and 156.5 in 1891.

⁴ *Wages of Farm Labor in the United States*, 7-9.

⁵ The industries not finally included were groceries, gingham, spice, and sidewalks. Report, I, 175.

basis for the investigation, there were employed 1,945,000 persons, as shown by the tables of occupation of the census of 1880.¹ These laborers formed about 11 per cent of the whole number of persons engaged in gainful occupations in the census year. In the 17 industries quotations were gathered from 84 different establishments. But in several establishments the quotations did not reach back as far as 1860, so that they could not be utilized in the final summary.² As a result, the Report is based upon not more than 75 establishments selected from 17 industries. Moreover, in seven cases out of the 17, returns were secured from only one establishment, which must have been regarded as typical of the entire industry. In two cases, only two establishments were investigated; in two other cases, three establishments were selected; while three industries are represented by four establishments each. This left the stone industry represented by six establishments; the metal industry with 19 establishments; and the building trades with 21 establishments. More unfortunate still is the fact that all of the establishments investigated, with one exception,³ were situated in a few states north of the Potomac and east of Ohio. An examination of the statistics in detail discloses the fact that the seven industries that are represented by a single establishment give results that vary considerably from the average for all industries.⁴ For 1891 a simple unweighted average for all lines of business shows an increase of 60.7 per cent over the wages for 1860; but in these seven industries the 36 series of quotations secured show an increase of 70.56 per cent.⁵ Some surprise also is occasioned by the discovery

¹ Report, I, 175-176.

² In the seventeen industries the following establishments seem to have been thrown out for the reasons stated: Nos. 4, 11, 25, 30, 31, 32, 49, 63, and 64. Establishments, 43, 44, 77, and 78 were in the four industries that were wholly excluded.

³ Establishment 48 was a gas plant situated in Ohio.

⁴ On this point A. L. Bowley writes: "It is found that, if a diagram is drawn, representing by twenty-two lines the changes in the twenty-one industries and in the average, many of the lines diverge very far from the average line; and the most divergent are precisely those for which the figures depend on insufficient data." *Economic Journal*, v, 376.

⁵ The data for this computation may be found on pp. 111, 112, 119, 135, 159, 160, 165 of the first volume of the Report.

that the single dry goods establishment enumerated, in which the wages are taken as typical of the wages of the 858,444 clerks employed in stores in 1880, was located in New Hampshire. In this highly typical and average store, 14 clerks were employed in 1891, and wages increased 88.6 per cent between 1860 and 1891.¹

It appears, therefore, that the wage statistics of the Aldrich Report rest upon a narrower basis than could have been desired if it was intended to serve as a guide to the general course of wages in the United States. As it stands, 17 industries and 75 establishments, situated in the same section of the country, furnished all the materials utilized. Five hundred and forty-three series of wage quotations were obtained for the period from 1860 to 1891.² But not all of these were complete for the entire period, and the number of complete series can not be much above 500.³ For the basal year, 1860, it appears that the Report gives statistics for 6586 laborers, who earned the sum of \$7,771.17. In 1891 data are presented concerning 8290 persons, who received \$15,292.⁴ These results we are asked to accept as typical for the United States.

The next criticism to be raised against the Aldrich Report concerns its choice of a base for its statistics of relative wages. The method adopted is explained in the following words:⁵ "The wages in January, 1860, are taken as the basis, and subsequent wages are calculated as percentages of the same." Thus tables of index numbers are computed for all the series of quotations. The Report considers the strong

¹ Report, I, 173 ; III, 857-863.

² The period 1840 to 1860 is covered by only sixty-one series, gathered from only eight or nine industries, many of which are represented by a single establishment. See Report, I, 110, 111-171.

³ Mr. F. C. Waite states that thirty-one series are blank for the year 1860. See *Prices and Wages*, 9 (Washington, 1894). Forty-one series of quotations are included in the four industries omitted from the final calculation. If the Report included these in its list of five hundred and forty-three, the number of series actually used is considerably less than five hundred.

⁴ See the computations by A. L. Bowley in the *Economic Journal*, v, 373.

⁵ Report, I, 110.

theoretical objections that may be raised against taking the statistics for a single year as the starting point, but states that 1860 may be fairly considered a normal year.¹ This may be granted, and the objections may be waived; but the further difficulty arises that the Report does not secure average wages for 1860, and selects the quotations for a single month. This may have been unavoidable, under all the circumstances; but attention should be directed to this fact in a critical examination of the data here presented. The questions involved illustrate well the difficulties under which the collector of wage statistics necessarily labors.

As a rule, the Report seems to have used the January wages for each year, and to have neglected the July quotations, which were secured whenever possible. But this is not always the case. With the wages of bricklayers and quarrymen, and perhaps some other laborers, the July wages were used.² This has been explained upon the ground that, with these classes of laborers, the summer wages were regarded as a fairer basis for comparison.³ Upon the same principle, the Report, in its statistics of prices of commodities, usually selected the January quotations; but, with such articles as fresh vegetables, used the prices for other months.⁴ The writer can express no opinion concerning the question whether the January or the July quotations are better suited to the purpose of ascertaining the course of wages in occupations where employment is somewhat dependent upon the seasons. Neither can he ascertain the number of series in which the July wages have been followed, and the results of selecting

¹ Report, i, 28.

² See the bricklayers, and their helpers in establishments 12, 22, and 26; also the quarrymen in establishments 79 and 80; the carpenters in establishment 7; and the masons in establishment 9.

³ The writer may quote from a letter received from the Statistician of the Report: "If in some cases where January and June wages were equally available, the latter were chosen, it was because . . . the summer wages were regarded as distinctive rather than the winter wages. I think this is true of bricklayers."

⁴ Report, i, 29.

these rates rather than those paid in January.¹ But it seems unfortunate that such an element of uncertainty should have been left in the Report.

In at least two other cases the January quotations were not strictly followed. In establishment 6, the quotations for press feeders begin in July, 1861, with a single employee, who received 33 cents per day. This was clearly an abnormal rate, since by January, 1862, it had been raised to 50 cents; while no rate lower than 50 cents appeared in any following year.² The series should have begun with January, 1862; but the July quotation of the previous year was selected, and the rate of increase was greatly exaggerated as a consequence. In the second case a more serious error was made. Boiler makers' apprentices, in establishment 68, are credited with wages of 37.5 cents in January, 1860, and with wages of 43.5 cents in July of the same year. In 1891 they received 75 cents in January and 77.5 cents in July. The Report evidently selected the quotation for January, 1860, the lowest rate for that year, and the quotation for July, 1891, the highest for the latter year. Thus these laborers were credited with an increase in wages of 106.7 per cent, which represents the difference between 37.5 cents and 77.5 cents.³ This computation, although it results in only a slight exaggeration of the rate of increase from 1860 to 1891, is enough to shake one's confidence in the accuracy with which the materials were handled. In the rest of the 500 series no similar error may occur. But the tables, as they stand, are open to reasonable suspicion of error.

One other point must be noted in this connection. About 30 series of quotations seem to be blank for 1860. In such cases the wages paid in 1859, 1858, 1857, 1856, and 1861 were taken as the starting point; and the wages for 1891 are com-

¹ In ten series, where July wages were used, the writer found some cases in which the January wages gave the same per cent of increase from 1860 to 1891 as was computed from the July figures. In other cases the January rates gave sometimes smaller and sometimes larger rates of increase than were indicated by the wages for July.

² Report, II, 386.

³ See Report, I, 147; III, 1231-1232.

puted as percentages of such a base. This may not have caused any great error in the final result, but it is at least an uncertain element in the Report.

The next criticism of the Report concerns the methods adopted in the computation of average wages for each year. The ordinary method of averaging wage statistics is to divide the total amounts paid in wages by the total number employed. If our statistics included all laborers in a community, we could deduce with perfect accuracy an average wage for the community. Such an average would be arithmetically correct, although it might not be typical of the conditions under which the mass of the laborers actually lives. For this last purpose the classified wage table is better. But, obviously, such completeness can not be secured in our investigations, and the question immediately arises: How shall our data be handled so as to make them as typical as possible of the wages received by the entire class of wage earners? If the classified table is adopted we present an actual picture of the concrete conditions of living of that fractional part of the laboring population whose wages have been investigated. The results will have more or less significance according to the confidence that can be placed in the fairness with which the data were gathered, and according to the comprehensiveness of the enumeration. The more common method, however, has been to compute an arithmetical average of wages paid to the groups of laborers under consideration, and to take this average as typical of the earnings of all laborers. When this is done it is evident that, in the determination of the average, each separate wage quotation is given an importance proportional to its size, because the higher rates of wages affect the average much more than the smaller rates can affect it. Such a mode of procedure results in giving the several wage quotations an arbitrary weighting, and the average wages thus computed may not be representative of the average remuneration of all workers in the community, for the reason that the investigation may have included an

undue proportion of high-priced or low-priced laborers. It is sometimes possible, however, to make allowance for such errors. Within each industry the separate quotations for each distinct employment may be weighted by a weight corresponding to the proportionate number of persons in such employment, when the data necessary for such a computation are at hand. In the next place the quotations may be grouped by industries, and the results for each industry may be given an importance corresponding to its rank in the community.

A third method is the use of index numbers, the expedient employed in the Aldrich Report. If the wages quoted for each laborer should be converted into an index number, and an average computed, the consequence would be to give to each separate quotation precisely the same importance in determining the final result that is given to any other quotation. Such a weighting of the figures would be just as arbitrary, as to give each quotation an importance proportional to its amount in dollars and cents, which we have seen to be the result of computing a simple arithmetical average of all the quotations. Data secured by computing a separate index number for each quotation should be corrected by devising a system of weighting that would give each index number a weight proportional to the importance of the industry and the branch of employment represented.

But the Aldrich Report does not construct separate index numbers for all quotations. Within each establishment the laborers in each branch of employment form a series. Thus, in establishment 42, three series of quotations were secured. One series represented the wages of one porter, the second represented the wages of seven salesmen, and the third represented the wages of six saleswomen. Within the various series it oftentimes happened that different rates of wages were received by the different laborers. In such cases the Report determined the arithmetical average, and made this the basis for the series. When the Report undertook to group the

wage quotations in series, it introduced into its computations an entirely arbitrary system of weighting. Many of the 500 series represent the wages of a single man, while others represent the wages of groups that include scores and even hundreds of workmen. In averaging the quotations, therefore, it is evident that the importance given to the wages paid to each individual laborer varied inversely as the number of persons included in the series to which he belonged. Where 20 men are included in a series, the quotation for each man receives $\frac{1}{20}$ of the weight that is given to another series that represents the earnings of a single workman. We may, then, lay down the general rule that the Aldrich Report gave to the quotation representing the wages of any single laborer an importance that varied inversely with the number of persons engaged in his branch of employment. It would seem that a very different method ought to have been adopted, if it was desired to make the results obtained by a study of the six or eight thousand laborers included in the Report typical of the conditions existing in the entire country. In the Twenty-Eighth Annual Report of the Massachusetts Bureau of Labor Statistics a somewhat similar problem arose. The Bureau took pains to determine the relative importance of each branch of employment within each industry, and to give to the average wages computed for each branch a weight proportioned to its importance in the entire industry. This is precisely the reverse of the method employed in the Aldrich Report, and both methods can hardly be correct.

In the subsequent weighting of the index numbers for the 500 series this error was not corrected. The series of index numbers for each industry were given a weight proportional to the importance of the industry, as indicated in the Tenth Federal Census. Thus the same weight was given to a series representing one man as was given to a series representing 100 common laborers in the same establishment. In one instance a single brewer, who received \$6.89 per day in

1860, and \$23.96 in 1891, is given as much importance as seven coopers in the next series, or five foremen laborers in the third series, or 41 common laborers in the fourth series, or 10 teamsters in the last series.¹ Since these quotations were all secured in the same establishment, each series was given equal weight in determining the weighted average for all industries. It will be worth while to take another example in which the series selected for our study are drawn from different industries. This typical brewer, who received over \$6000 per year, and was certainly worth that amount as a subject for statistical investigation, counted for as much in determining the simple average as 188 laborers who were included in a single series in establishment 48.² The brewer's wages increased 275 per cent between 1860 and 1891. The wages of the 188 laborers increased 29.5 per cent. The Report has adopted a method of averaging that gives equal weight to each of these series, and figures out a simple average increase of 152.25 per cent for the 134 workmen. In computing the weighted average for all industries the Report makes a bad matter worse. The industry in which the brewer was employed is given a weight of 16, while that in which the 188 laborers were engaged receives a weight of 5.³ Such a method of weighting made the brewer simply invaluable for statistical purposes.

This is, of course, an extreme instance; but there are others that are nearly as bad. In some cases, however, the series that contain but one man show lower rates of increase than those that contain many more employees. But, in general, it may be said that the "one man" series include many such persons as foremen and overseers, whose wages are subject to considerable increase, by reason of greater efficiency, or by reason of the growing demands which the increasing complexity of the business may make upon the holder of such a position. The wages of such workmen would be likely,

¹ These are the numbers employed in January, 1891. See Report, I, 112; II, 312-329.

² Report I, 141; III, 331.

³ Report, I, 176.

over a period of 31 years, to show a greater rate of increase than would hold true in the case of other grades of laborers.

In order to determine the nature of the influence which these "one man" series exercised upon the final result, the writer made an examination of all such cases. There are not less than 117 "one man" series in the Report. This is much more than $\frac{1}{5}$ of the whole number. From 1860 to 1891, according to the methods of averaging adopted in the Report, these 117 series show an increase of wages that is about 12 per cent greater than the figures computed for all industries.

The methods employed by the Report, in computing the weighted average, are open to further objection. We have already seen that seven industries out of the 17 investigated were represented by a single establishment. This was undoubtedly an inadequate basis of observation, and it can not be claimed that an average wage computed from such materials is necessarily or even probably typical of these seven industries. The insufficiency of the data is truly startling. According to the census of 1880 these industries employed nearly 685,000 hands.¹ From this number the Report secured only 38 series of quotations,² which included only 633 workmen in the year 1891. This was considerably less than $\frac{1}{10}$ of one per cent of the total number of hands employed in these seven industries in 1880, and a still smaller percentage of the number engaged in 1891. What possible assurance have we that these data, gathered in the four states of New Hampshire, Massachusetts, New York, and Pennsylvania, are typical for all the employees engaged in these occupations throughout the country? Now when we average the rates of wages attributed to these seven industries, according to the methods followed by the Report, it appears that the 38 series of quotations show an average increase of wages amounting to 70.5 per cent, between 1860 and 1891. The simple average that the Report claims for the 17 industries is 60.7 per cent.

¹ Report, I, 175.

² Report, I, 111, 112, 119, 125, 159, 160, 165.

This fact is of significance in two ways. Since the results for these industries, represented by insufficient data, diverge so considerably from the results indicated in other industries, where the enumeration was more comprehensive, we have a positive reason for suspecting that the establishments selected were not typical of the industries to which they belong. In the second place it is probable that the inclusion of figures based upon insufficient data resulted in an exaggeration of the rate of increase of wages between 1860 and 1891, when the Report computed a simple average for all industries. The matter was made still worse when the weighted average was calculated. These seven industries were then given weights that aggregated 684 out of a total weighting of 1945 that was applied to all industries.¹ This performance exaggerated still more the rate of increase between the years 1860 and 1891.

In view of the foregoing facts, three conclusions seem to be warranted. First, it is clear that the Report does not present sufficient data for determining with certainty the course of wages in the United States. Our great industry, agriculture, is not represented at all; and the statistics used in computing the average wage for all industries relate, for the year 1891, to only 8290 laborers, employed in 75 establishments situated in the same section of the country. In the second place, the base from which percentages of increase or decrease are calculated consists of quotations for a single month. This month is not always the same; and in some cases the year selected is not 1860, but some previous or succeeding year. In at least one instance a gross error was made at this point in handling the materials. Finally, the methods employed in determining the average wage for all industries weighted the quotations in an erroneous manner; and the result of the errors was always the same, *viz.*, to exaggerate the rate at which wages increased between 1860 and 1891. While a study of the actual quotations will convince the reader that

¹ Report, I, 176.

there has been a very material increase of wages in these 75 establishments since 1860, it is impossible to accept the computations of the Report concerning the rate of increase. A simple arithmetical average of the wages paid to the 6586 persons enumerated in 1860, and to the 8290 persons enumerated in 1891, shows an average wage of \$1.19 in the former year, and a rate of \$1.84 in the latter.¹ The ratio of these averages is 100 : 155.4. The Aldrich Report computes a ratio of 100 : 160.7 by a simple average, and a ratio of 100 : 168.6 by the use of a weighted average. While it is possible that the data might be handled by a better method² than the calculation of a simple arithmetical average, it seems entirely certain that the Report did not succeed in its attempt to accomplish such a result.

¹ See computations of A. L. Bowley in *Economic Journal*, v, 373.

² Mr. Bowley, in the article above mentioned, attempts to find such a method.

A YEAR OF STATE DEFICITS.

One feature in public finance is remarkable because of its prevalence throughout the civilized world—the growing disparity between government revenue and expenditure. Were this merely a repetition of a phase of national life which has often been witnessed, where depression has reduced revenue below the requirements of the government, to be followed by a rapid recovery on a return of prosperity, the matter would hardly demand notice. Were it a deficit to be made good by the simple extension of existing methods of taxation, it would still be of ordinary interest, and a statement of income and expense would be sufficient to measure the deficit without explaining the cause. But the situation offers a more serious problem, for it seems to raise the question of national revenue in a form other than has been recognized. Are the existing taxes failing to obtain revenue from the people, and must a new system be devised for enabling the governments to obtain what they need, even assuming there is no marked increase in the amount of expenditure?

In the countries of southern Europe the existence of a deficit in the the national budget has come to be regarded as something to be expected. Portugal has for many years been bankrupt, and is satisfied to obtain the little she can at usurious rates and with practises that would ruin a stronger country. Spain is in no better position, for the weight of debt and the circulation of much inflated and irredeemable paper currency have deprived her of any credit in other money markets, and her resources have been so heavily mortgaged as to leave nothing for future negotiations. Italy has found increasing difficulty in meeting her expenses, and, ambitious to rate among the great powers, she has exhausted her people in lavish and unproductive expenditures, in costly army and navy, and in various colonial ventures. From mere weariness she is now contracting her ambitions in Africa and accepts the position of a weak power. The injury to her people has been enormous, so large as to render any expectation of recuperation out of the question. With a floating debt of \$110,000,000 there is to be a deficit of \$28,000,000 to be met in the operations for 1898-99. The revenue is falling away, and the ministry are unwilling or unable to effect economies in an overgrown

and, it is believed, corrupt civil service. Any additions to their taxes will increase the disaffection of the people, already great, and kept under only with difficulty. Yet she demands of China concessions which she cannot enforce without large expense and trouble.

Only a little above these countries in its fiscal character stands France. This people have long had the largest debt and the heaviest taxation per capita of any civilized power, and the inability to make the revenues meet the rapidly increasing expenditure has become greater each year. The budget proposals for 1899 call for a total expenditure of \$695,000,000, an increase of more than \$17,000,000 over the budget of 1898. But the preliminary propositions are invariably very favorable, and to make them favorable economies are assumed to have been accomplished, the floating debt is put out of sight, and the revenues placed at the highest point. Assuming that this point is maintained every dollar of the additional expenditure must be met with an increase of old taxes, or the laying of new imposts. The revenue for 1898 was not sufficient to meet all the demands made upon it, and between ordinary credits and extraordinary credits, the transfer of sums from one department or cause of expense to another, the budget is not closed for some years after the end of the year it is intended to cover. Still a deficit remains, and one of no light amount, to be added to the floating debt or funded by the sale of *rentes*.

Germany is in a better position as increasing burden can be shifted to the confederating states. No matter what the deficiencies in revenue from imperial taxation may be, it is made good by being quotaed among the different states. That there should be a limit to this process is only natural, for a demand much heavier than usual would lead the states to ask whether the advantages of confederation were worth the money they required — a question that was often asked under Bismarck, leading him to devise many new schemes for increasing the imperial revenues. In fact, had his wish on the brandy monopoly and similar plans been carried, it would have made the empire financially independent of the states, thus increasing its powers and leaving it more free to enter into foreign projects and build up that huge military engine it fears must some day be employed to save it from destruction.

The imperial budget for 1899 calls for an expenditure of \$388,800,000, and in the statement of the minister the revenue will just balance that amount. To obtain this equilibrium, however, the states are called upon to pay out of their income the sum of \$122,500,000, an increase of \$8,500,000 over that required for 1898. As the items for the army and navy alone have risen by \$10,000,000 in a year, the chancellor counts upon a good increase in the revenues from taxation, especially from those from customs and on consumption. Should these fail, the states will be expected to make good the deficiency, and the states depend upon direct taxes for their funds, taxes which make the people feel their presence and resent an increase of pressure. The only alternative is to borrow money by selling government stock, something to be avoided, as the imperial debt appears to grow in spite of every effort to keep it down. Since 1891 the capital of the debt has been increased by \$175,000,000; and although the operations of the German treasury for the fiscal year 1898 showed an apparent surplus of \$22,500,000, the sum of \$10,875,000 was added to the debt. Only through extraordinary receipts and the contributions of the states is this tendency to pile up debt held within moderation.

Austria-Hungary has been so disturbed in its domestic politics it is not strange to find its finances in a greatly disordered condition. What makes the crisis the more severe is the fact that no emission of *rente* or government stock can be made without the constitutional approval of the Reichsrath. The government is thus powerless to meet a deficiency or sudden demand for a large expenditure, as an imperial decree can not make good the guarantee to a loan provided by the constitution, and any attempt to avoid this legislative control over the debt would seriously affect the credit of the empire. Some such limitation was needed; otherwise a finance minister might increase the imperial or joint debt to any amount, and so cripple the two parts of the empire in their undertakings. For there is a special debt of Austria and another of Hungary, and it has been regarded as better policy to increase the individual debts than to permit the growth of a joint debt. In this way a greater sense of responsibility is imposed, and the extravagance of a government is placed more immediately under the cognizance of the people obliged to pay the taxes.

This plan is not without disadvantages. In the joint budget for 1899 there was an additional sum of 30,000,000 florins to be met for war expenditures, and such an item offered a fair opportunity to discuss the financial relations of the two countries constituting the empire. In their present strained relations no attempt was made to determine the share of the budget to be borne by each, and this delicate matter was left to the decision of the Emperor, whose personal influence is very strong in maintaining peace between the German and the Slav elements. Already a loan has been negotiated by the joint financial minister, and on terms regarded as unusual.

In the Hungarian budget for 1899 the ordinary receipts would leave a surplus of 22,500,000 florins on the ordinary expenditures. But there are extraordinary expenditures to be met, and, in spite of some extraordinary revenue, they are sufficient to swallow up the surplus. This has been the situation for some years, but the most cautious calculation is required to produce this equilibrium, and there is a small amount added each year to the Hungarian debt, already large. Nor was the minister of Austria able to show better results in his recent budget. The requirements are placed at 760,286,793 florins, or more than 36,500,000 florins more than those for 1867, and the receipts are placed at nearly the same amount, but are estimated at 37,500,000 florins more than they gave in 1898—a rosy anticipation of an overflowing treasury.

Even England faces a deficit after a long term of adequate revenue and a small surplus to be applied to the reduction of the debt. The heavy demands made upon the United Kingdom by the necessity of maintaining a navy equal to any two European navies combined have made themselves felt in the budget, and to them is due the deficit, now small and easily managed, but sure to increase from year to year with the political exigencies of the empire. Believing that the command of the sea is essential to her very existence, Great Britain must maintain that command at every cost.

Outside of Europe, Japan is the country presenting the most interesting budget features. A recent report on the finances of that country contains a note of warning that is as applicable to the United States. "Financially, Japan's military success over China seems likely to prove a heavy and constant burden. . . . The outlay to which the country has pledged itself on account of various enter-

prises, which are to be carried through within the next ten years, far surpass that amount (100,000,000 yen). These enterprises fall under two categories — productive and unproductive works. The total outlay on productive enterprises, of which the programme has already been settled, amount to 190,000,000 yen, and on unproductive works the outlays during the next decade will come to 325,000,000 yen. This will be the price which the nation will have to pay for the vast scheme of industrial and commercial development on the one hand, and of naval and military expansion on the other, on which the government has decided to embark since the conclusion of the war."

The latest budget proposals showed a deficit of 26,000,000 yen, all of which it was proposed to meet by increased taxation. But Japan has given of late signs of being overtaxed, and a readjustment of imposts has not been followed by elasticity of revenue. To double the land tax, in a year when the farmers were suffering from poor crops, was not an acceptable suggestion; yet no duties on consumption could meet the needs of the government. The last loan offered by the government has not been filled, and a new offer would depress the credit of the state at home, and affect its ability to borrow in foreign markets save at disadvantageous rates.

It would be unnecessary to describe in detail the financial difficulties of other countries, suffering from over speculation or excessive investment in ventures promising future returns, but offering little at present. Australia, Argentina, Brazil, Chile, India, and Mexico tell much the same story, of rising expenditures, increasing debts, and uncertain revenues. Of the United States nothing need be said, for the daily returns show the increasing deficit, and the extravagance of the last session of Congress has become recognized. Russia is still juggling with her official budget statement, showing a surplus in the face of enormous taxation, crushing the life out of the people, and vast undertakings in Asia which may involve war and will certainly mean heavy expenditures.

There is no immediate prospect of any halt in the demands made upon the governments for expenditures. It is inevitable that the objects of expenditure should become more costly and more numerous as the social relations of a state become more complex. The United States can not escape this general movement, but it should consider with great care the reasonableness of some of the demands made upon it.

The idea has become popular that the government must take the initiative in many costly undertakings, such as the Nicaraguan Canal, the construction of a railroad the length of Cuba, the building up of a merchant marine through subsidies, and the encouragement of navigation interests by an extension of the navigation laws, giving a monopoly of the coastwise trade to American vessels. This policy is an extension to our new dependencies of the protective tariff policy so closely maintained at home. Instead of confining the benefits to the home markets, it is sought to build up great commercial interests in the late Spanish islands, and such an ambition will be very costly to realize. The United States, already suffering from a deficit, enters upon a career of development which involves an almost hopeless disparity between income and expenditure, so long as existing methods of obtaining national revenues are maintained.

After this survey of the leading nations of the world, with their problems of making their supplies meet their needs, it is refreshing to turn to a country where the treasury is conducted so as to take as little as possible from the people. Egypt is in the position of a railroad in the hands of a receiver; its government must continue, but its finances are under a foreign control, and subject to regulations of more than one power. Yet the treasury flourishes, and debt and taxes have been brought to a reasonable minimum, under which the people are not oppressed, and the economy of the country is developed every year towards strength and independence. It is a business matter run on business principles, and so successful has it been that the people have ceased to be cruelly harried and oppressed by their governors, and have been a producing factor of moment in the commerce of the world. The Soudan has been reclaimed from barbarism, the fellah has become a peasant proprietor, and enjoys a commercial freedom and importance which would have been thought impossible less than twenty years ago.

Herein lies the whole problem. A people may spend freely on business principles in directions where the cost is returned many times over in public welfare. But politics or interested partisanship introduces an element that is ruinous to the public good, and debauching to the public service.

WORTHINGTON C. FORD.

MISCELLANY AND NOTICES.

CENSUS OF 1900.

The Act to provide for taking the Twelfth Census of the United States may be summarized as follows: The census office is subordinated to the Department of the Interior; the director of the census is appointed by the President and receives an annual salary of \$6000. There is provision for an assistant director who shall be an experienced, practical statistician and shall receive a salary of \$4000. There shall also be appointed by the director five chief statisticians "who shall be persons of known and tried experience in statistical work, at an annual salary of \$3000 each; a chief clerk, one disbursing clerk, and one geographer, at an annual salary of \$2500; five expert chiefs of division, and two stenographers, at an annual salary of \$2000 each; ten clerks of Class 4; fifteen clerks of Class 3; twenty clerks of Class 2; and such number of Class 1, and of clerks, copyists, computers, and skilled laborers, with salaries at a rate of not less than \$600 nor more than \$1000 per annum." Provision is also made for the appointment by the director of watchmen, messengers, laborers, etc.

Section 5 reads as follows: That the chief clerk and the chief statistician and all other employees below the assistant director of the census shall be appointed by the director of the census subject to such examination as said director may prescribe, *provided* that no examination shall be required in the case of enumerators or special agents, nor employees below the grade of skilled laborers at \$600 per annum.

The inquiries of the Twelfth Census shall be restricted to the population, mortality, products of agriculture, and of manufacturing and mechanical establishments. The schedules "relating to the population shall comprehend for each inhabitant the name, age, color, sex, conjugal condition, place of birth, and place of birth of parents, whether alien or naturalized, number of years in the United States, occupation, months unemployed, literacy, school attendance, and ownership of farms and homes; and the director of the census may

use his discretion as to the construction and form and number of inquiries necessary to secure information under the topics aforesaid. The mortality schedules shall comprehend for each decedent the name, sex, color, age, conjugal condition, place of birth, and birth-place of parents, occupation, cause and date of death, and, if born within the census year, the date of birth. The form and arrangement of the schedule and the specific questions necessary to secure the information required shall be in the discretion of the director. The schedules relating to agriculture shall comprehend the following topics: Name of occupant of each farm, color of occupant, tenure, acreage, value of farm and improvements, acreage of different products, quantity and value of products, and number and value of live stock. All questions as to quantity and value of crops shall relate to the year ending December 31st next preceding the enumeration. The specific form and division of inquiries necessary to secure information under the foregoing topics shall be in the discretion of the director of the census. The schedules of inquiries relating to the products of manufacturing and mechanical establishments shall embrace the name and location of each establishment; character of organization, whether individual, coöperative, or other form; date of commencement of operations; character of business or kind of goods manufactured; amount of capital invested; number of proprietors, firm members, co-partners, or officers, and the amount of their salaries; number of employees and the amount of their wages; quantity and cost of materials used in manufactures; amount of miscellaneous expenses; quantity and value of products; time in operation during the census year; character and quantity of power used, and character and number of machines employed. The form and subdivision of inquiries necessary to secure the information under the foregoing topics relating to manufacturing and mechanical industries shall be in the discretion of the director of the census. The information collected shall be of and for the fiscal year of such corporations or establishments having its termination nearest to and preceding the first of June, 1900. Whenever he shall deem it expedient, the director of the census may withhold the schedules for said manufacturing and mechanical statistics from the enumerators of the several subdivisions in any or all cases, and may charge the collection of these statistics upon special agents, to be employed without respect to locality. In cities or States where an official registration of deaths

is maintained the director of the census may, in his discretion, withhold the mortality schedule from the several enumerators within such cities or States, and may obtain the information required by this Act through official records, paying therefor such sum of money as may be found necessary, not exceeding two cents for each death thus returned. The director of the census is also authorized and directed to make suitable provisions for the enumeration of the population and products of Alaska and the Hawaiian Islands, for which purpose he may employ supervisors and enumerators or special agents as he may deem necessary. The only volumes that shall be prepared and published in connection with the Twelfth Census, except the special reports hereinafter provided for, shall relate to population, mortality and vital statistics, the products of agriculture, and of manufacturing and mechanical establishments, as above mentioned, and shall be designated as and constitute the census reports, which said reports shall be published not later than the 1st day of July, 1902. The report upon population shall include a series of separate tables for each State, giving by counties the number of male persons below and above the age of twenty-one years, their color, whether native or foreign born, whether naturalized or not, and their literacy or illiteracy. All terms expressing weight, measure, distance, or value shall be expressed in the terms of the English language as spoken in this country."

Section 8 provides that after the completion of the schedules relating to mechanical and manufacturing establishments that the director shall collect statistics relating to special classes, including the insane, feeble-minded, deaf, dumb, and blind, crime, pauperism, and benevolence, including prisoners, paupers, juvenile delinquents, and inmates of benevolent and reformatory institutions; to births and deaths in registration areas; to social statistics of cities; to public indebtedness, valuation, taxation, and expenditures; to religious bodies; to electric light and power, telephone, and telegraph business; to transportation by water, express business, and street railways; to mines, mining, and minerals, and the production and value thereof, including gold, in divisions of placer and vein, and silver mines, and the number of men employed, the average daily wage, the average working-time, and aggregate earnings in various branches of the mining industry. These reports relating to mines, mining, and

minerals must be published on or before July 1, 1908. Special agents may be appointed for securing such statistics. The statistics of births and deaths shall be obtained from and restricted to the registration records of such States and municipalities as possess records affording satisfactory data in necessary detail, in the discretion of the director, the compensation for the transcription of which shall not exceed two cents for each birth or death reported. The statistics of special classes shall be restricted to institutions containing such classes, provided that at the time of the census enumeration the data relating to these classes may, in the discretion of the director, be collected by the enumerators of such institutions who shall receive compensation therefor at rates not exceeding in per capita districts five cents for each name enumerated and returned.

Section 9 provides for the appointment by the President, by and with the advice of the Senate, of not more than 800 supervisors. It is also here provided that "wherever practicable and desirable the boundaries of the supervisors' districts shall conform to the boundaries of Congressional districts." Each supervisor shall receive the sum of \$125, and, in addition thereto, in thickly settled districts, one dollar for each thousand or majority fraction of a thousand of the population enumerated in such district, and in sparsely settled districts \$1.40 for each thousand or majority fraction of a thousand, provided that in the aggregate no supervisor shall be paid less than the sum of \$1000.

Section 13 provides that the subdivision assigned to any enumerator shall not exceed four thousand inhabitants as near as may be.

Section 15 provides for the employment of interpreters whose compensation shall not exceed \$4 per day.

Section 16 provides for the compensation of enumerators as follows: In subdivisions where he shall deem such allowance sufficient, an allowance of not less than two nor more than three cents for each living inhabitant and for each death reported; not less than fifteen nor more than twenty cents for each farm; and not less than twenty nor more than thirty cents for each establishment of productive industry enumerated and returned may be given in full compensation for all services. For all other subdivisions per diem rates shall be fixed by the director of the census according to the difficulty of enumeration, having reference to the nature of the region to be canvassed and the density or sparseness of settlement, or other considerations

pertinent thereto; but the compensation allowed to any enumerator in any such district shall not be less than three dollars nor more than six dollars per day of ten hours' actual field work each. No claim for mileage or traveling expenses shall be allowed any enumerator in either class of subdivisions, except in extreme cases.

Section 17 provides that the compensation of special agents shall not exceed six dollars per day and actual traveling expenses, and an allowance in lieu of subsistence not exceeding three dollars per day during their necessary absences from their usual place of residence.

Section 19 provides that the enumeration of the population shall commence on June 1, 1900, and the enumerators must complete the enumeration and forward the returns on or before July 1st, provided that in any city having 8000 inhabitants or more under the preceding census, the enumeration of the population shall be taken and completed within two weeks from the first day of June.

Section 22 provides penalties for wilfully failing or refusing to render a true account in making returns.

Section 25 authorizes the director of the census to print and bind in the census office such blanks, circulars, and envelopes, and other items as may be necessary, and to print, publish, and distribute bulletins and reports of the preliminary and other results.

Section 32 appropriates \$1,000,000 for the organization and equipment of the census office and preparatory work.

VITAL STATISTICS OF THE WAR WITH SPAIN.

The following paragraphs are taken from an article in the *Boston Medical and Surgical Journal*, Dec. 29, 1898:—

In endeavoring to ascertain the actual statistics as to the deaths from disease and wounds received in battle we are hampered by the fact that in the summary of the surgeon-general's report for the year no mention is made of deaths from other causes than typhoid fever, malarial fevers, and diarrhoea and dysentery. These diseases are said to have resulted in 1180 deaths, while the total number of deaths of which full particulars had been received was 1715.

Other estimates place the total number of deaths in the army during the war at 2910. Of these the deaths of 2485 enlisted men and 80

officers resulted from disease; while 280 enlisted men and officers were killed in battle, and 61 enlisted men and 4 officers died of wounds received in battle.

The fatal casualties in battle in Cuba were 1 officer to 10 men — a percentage which is unusually high, and testifies well to the personal valor displayed by the American officers in leading their troops — about the same proportion of deaths from disease and in battle obtained as in the Civil War; but in comparing the two it should be remembered that a continuation of hostilities under the climatic conditions of Cuba would have greatly increased the proportion of deaths from disease.

The present status of our knowledge makes it very probable that when the returns are complete the highest death rate of the war will be shown to be that from typhoid fever contracted in the great camps established in the Southern States for the training and “acclimatization” of our troops, and the next largest proportion from the various forms of enteritis and the pernicious types of malaria, which, had it not been for the demand of the general staff for the return of the army from Santiago to the Northern Coast, would have caused as great a mortality as it had already morbidity in the Fifth Army Corps.

Too much importance cannot be attributed to the shortness of the period of hostilities, the early surrender of Santiago, and the consequent possibility for the quick return of our troops from Santiago, and the breaking up of the Southern camps, in preventing a high mortality which so many causes would have rendered inevitable had the war continued.

The most remarkable, not to say astonishing, fact in the medical and surgical history of this war, which was pre eminently a naval war, and of which the decisive battles were fought at sea, was the small number of casualties occurring in the American Navy. The superiority of our navy in armament, armor, personnel, discipline and equipment was so great that battles in which entire squadrons of the enemy's ships were sunk or burned to the water's edge resulted in so few casualties on the American side that the statistics include very low figures, so low, in fact, as to prove of very little value in increasing our knowledge of the casualties to be met with in modern naval

surgery. The casualties on the Spanish side were fearful both in numbers and severity, but the demoralization of defeat, and the very completeness of the destructive work of our gunnery, will probably preclude the elaboration of any accurate report of the injuries to the Spanish side, even if the organization of their medical department might have been sufficient under ordinary conditions for the preparation of such a report, which is a matter of doubt.

The total list of casualties in the navy during the war amounts to 16 killed, and 68 wounded, or a total of 84. Of the 68 wounded 54 were subsequently discharged to duty, 8 were invalided from the service, 4 remained under treatment when the report was published, and 3 died subsequently as a result of their injuries.

The admirable condition of health in which the Navy and Marine Corps were maintained during the period of hostilities, from April 21st to August 12th (114 days), is shown by the fact that out of an average strength of 26,102 men they were only 85 deaths, 29 being due to injuries, and 56 from diseases. The number of deaths from all causes, exclusive of those killed in battle, was 67, or an annual rate of 8.19 per 1000. Malaria, heat stroke, and diarrhoeal affections, all incident to service in tropical climates, proved the chief causes of sickness during the year. The health of the Asiatic Squadron, from April 21st to June 30th, varied but little from that of the previous year, the ratio per 1000 on the *Olympia* being less than that for the same period in 1897.

A STUDY IN IMMIGRATION.

The State Historical Society of Wisconsin desires to collect statistics and other facts in relation to immigration into the State of Wisconsin. The points on which information is desired to be utilized for studies are given below. They might be used to advantage by students of other States:—

1. Locality of the foreign group (if not in an incorporated municipality, then by range and township of the State system), and approximate population. It is especially requested that this point be covered, even though the others

cannot be investigated. Give also the exact locality in Europe from which the group came.

2. Reasons for emigration. Did they leave because of a political revolution? religious causes? economic considerations? Give the specific reasons. Obtain these by interviewing representative men as to why they left the mother country; why they came to Wisconsin rather than to some other State; and why to the particular locality in which they settled. Report their answers.

3. Process of emigration, how organized and how conducted. This should also include an account of costumes, personal property brought, expenses, difficulties encountered in settling, etc.

4. Comparison of wages and cost of living in their new and in their old home. The separate industries should be treated, as far as practicable.

5. Do they, to any degree, maintain their native institutions, township government, churches, schools, etc.?

6. To what degree have they changed from the primitive type? This includes a study of the process of transition from the condition of a foreigner to the condition of complete assimilation to Americans in language, institutions, customs, dress, etc. State any conditions that interfere with this process of assimilation.

7. Effect of the group upon their neighbors. To what degree is their intermarriage? Have they, in their neighborhood, effected any changes in methods of farming, or in other industries?

8. What offices of honor have members of the group held (federal), State, or local.

9. To what political party do a majority of the members of the group belong?

10. Miscellaneous facts relative to the religious life of the group. The denominations represented, and their numerical strength; the extent of denominational schools; whether these schools are conducted in other languages than English, etc.

It is purposed to obtain a complete and accurate description of each foreign group within the State. The replies should therefore be as detailed and specific as possible, in order to bring out the social life and other peculiarities of each separate group. No trivial point should be omitted that will aid in securing such a result. Guess work should be avoided, dates should be given precisely; and, as far as possible, exact figures should be presented, regarding numbers, expenses of transportation and living, wages, etc.

Printed or written documents, in English or otherwise, bearing upon this inquiry, will be thankfully received by the undersigned for the Society.

RAUBEN G. THWAITES,

*Secretary State Historical Society of Wisconsin,
Madison, Wis.*

NOTES.

Statistik der Reichstagswahlen von 1898. Pp. 78 and map. Berlin. Puttkammer & Mühlbrecht.

The subject matter is divided into four parts. The first gives the population, registered voters, total number of votes cast, both valid and invalid, the voters for each party, and number of members of Reichstag elected by each party, for each state and province of the Empire; the second, the vote in detail in each of the 397 electoral districts, population of each district, percentage of Protestants or Roman Catholics, whichever was in the majority, and other data; the third, the name, occupation, residence, and vote of each candidate; and the fourth, a map illustrating the geographical distribution of the various political parties, of which there appear to be 22, though only about 14 have a sufficient following to demand serious consideration.

One effect of the large number and the geographical distribution of parties may be seen in the fact that the German Conservatives cast only two-fifths as many votes as the Social Democrats, but elected the same number of representatives, 56; while the Centre, casting two-thirds as many votes, elected 102. Again, a redistribution of seats according to the present population, but without increasing the membership of the Reichstag, while making no material change in the representation of the states, would considerably increase the number of members from some of the cities and thus specially benefit the Radicals and Social Democrats. The inequality of the electoral districts is particularly noticeable in Berlin; where the population of districts ranges from 90,657 to 586,926.

Report of the Wisconsin State Tax Commission, 1898. Madison, Wis.; pp. 276.

In 1897 the legislature of Wisconsin authorized the appointment of a Tax Commission to make report in 1898. This commission has now submitted a report of more than usual interest. The titles of the successive chapters indicate the scope of the investigation: Origin and growth of the taxing system in Wisconsin; present taxing system; defects as to levies and as to collection of taxes; taxation of notes, bonds, mortgages, and other securities; taxation of corporations; inheritance and income taxes; and a synopsis of reports of other tax commissions. There are also statistical appendices illus-

trating the various points considered, and at the end there is a bibliography of works on taxation covering some thirty pages. There is nothing particularly unique in the tax system of Wisconsin. The property tax plays a large part, and the defects found elsewhere are here reproduced. From 1877 to 1897 the aggregate assessed value of real estate rose from 274 millions to 519 millions, or about 89 per cent. During the same period the assessed value of personal property increased from 77 millions to 108 millions, or only about 40 per cent. The usual differences in assessment as found in different towns or different counties can be duplicated here. No radical recommendations are made, the commission contenting itself with presenting as complete information as possible of the present system, believing that citizens must be generally educated before any successful changes in legislation can be made.

The following paragraph, in regard to increase of wealth in Germany, is taken from *The Economist*, December 3, 1898:—

Equally striking is the growth in wealth, as shown by the latest income and property tax returns for Prussia. Leaving out of the account incomes of less than £45, the total incomes as declared since 1893-94 have shown the following ascending scale: £286,250,000, £289,250,000, £296,850,000, £304,300,000, and £318,700,000. Thus there has been an increase of £31,450,000, or about 11 per cent, in five years, of which nearly half accrued in the past year. Figures for all Germany are not accessible, but it is estimated that incomes for the whole Empire have increased about £55,000,000 during the past five years. The assessments for the general property tax in Prussia, exclusive of properties valued at less than £300, showed a total valuation of £3,283,850,000 for the year 1897-98, against £3,201,200,000 and £3,195,900,000 in the two preceding years. There has thus been an increase of £87,950,000 within three years. The increase of property valuations for the whole Empire during the same time is estimated at about £150,000,000.

In the *Twentieth Annual Report of the Bureau of Labor Statistics of Missouri*, 1898, p. 212, mention is made of the Missouri Free Employment Department which was inaugurated in connection with the Bureau of Labor, October 1, 1897. The office is in connection with that of the State Factory Inspector, 915 Chemical Building,

St. Louis. Practically the same force employed in the inspector's office has conducted the work of the free employment department. Blanks are given showing the forms of application, and methods of record. Between October 1, 1897, and October 1, 1898, 4661 applications for help were filled. Of these 1344 were for house-help, and 1064 for solicitors and salesmen. The number of persons registered desiring occupation was 7783. It is reported that many fraudulent employment agencies have been abandoned, so that where formerly there were 16 of these concerns in St. Louis, now there are only four.

The Report of the Bank Commissioners of Connecticut, December 31, 1898 (Hartford, Conn.), points out that the savings banks are more and more being used by capitalists as a place to invest their money "where they receive a larger rate of interest than can be obtained elsewhere." The total number of depositors in the Connecticut savings banks increased 9149, but of the increase in the amount of deposits only \$348,618 is due to those depositors having less than \$1000 to their credit, leaving \$7,164,082 as the increase in the deposits of those having \$1000 and over to their credit. Of the 789 banks, two paid 5 per cent, eight paid 4 per cent, three $3\frac{1}{2}$ per cent, one 2 per cent, and three none.

The State Superintendent of the Public Schools of Maine in his report for the year ending June 1, 1898, calls attention to the increase of illiteracy in New England. It is shown that there are in Maine 210,000 persons between the ages of 4 and 21. The average attendance in the public schools during the past year was 96,000. There are 1000 more children in the State between 5 and 14 years of age than there are pupils enrolled. The number of children between 5 and 14 exceeds the average attendance by 37,000. It is asserted that the compulsory laws are not enforced.

The following resolutions were passed at the meeting of the American Forestry Association, held in Washington, December, 1898:—

Whereas, It is essential for intelligent lumber operations and the proper utilization and preservation of the forest resources of the United States, that statistical information of a reliable character shall be acquired as to the kinds and quantities of timber in all the States and Territories, and

Whereas, The Division of Forestry of the United States Department of Agriculture is eminently qualified to gather this information, it is therefore

Resolved, That the American Forestry Association at their annual meeting, held in Washington, December 14, 1898, petition the Senate and House of Representatives of the United States that provision be made and that a suitable appropriation be passed to enable the Division of Forestry of the United States Department of Agriculture to gather this information, either in advance of, or in connection with, the Twelfth Census.

The Manufacturer of Philadelphia, December 17, 1898, gives another illustration of the discrepancies which occur between the United States statistics of imports from Great Britain and the English statistics of exports to the United States. It is found in the British reports that England exported a certain number of locomotives to the United States in a given year. On consulting the American reports no locomotives are reported as being imported from England or any other country. "The difficulty is just this, that when the ship carrying these locomotives left the United Kingdom it sailed for New York or Boston and its cargo was put down to the United States. When it got here and the vessel was unloaded it was found that the locomotives were not for American consignees at all but for Canada, whither they were shipped at once. Our customs officers, of course, did not reckon them as imports to the United States, and so there is a loophole for great confusion."

Otto Hübner's Geographisch-statistische Tabellen aller Länder der Erde; 47th issue, 1898. Edited by Dr. Fr. v. Juraschek.

The total population of the earth is estimated at 1544.5 millions. Three new tables are added showing the division of populations according to age. The table for European population shows the division for religion according to the separate States. This excellent publication does not on many subjects include the United States Census returns of 1890.

The Municipal Year-Book of the United Kingdom for 1898, edited by Robert Donald (London, pp. 430), aims to describe the constructive work carried out by British municipalities. A special chapter is devoted to Municipal government in London. There are detailed sections given to municipal electric lighting and gas supply, housing of the working classes, free public libraries, markets, slaughter houses, technical education, and tramways.

In the *Twentieth Annual Report of the Board of Health of Lowell, Mass., for 1897* (Lowell, 1898, pp. 78), the hope is expressed that before another year there will be a uniform national classification and basis which will much simplify the details and remove much of the confusion that now exists in comparing details on vital statistics.

Whitaker's Almanac for 1899 (London, pp. 776) includes among the new subjects the recent Employers' Liability Act of England, and National Debts of the World.

The *Annales de l'Institut des Sciences Sociales*, February, 1899 (Brussels), contains an exhaustive article on the national bank of Belgium with proposals for new legislation. The articles are by de Greef and Denis.

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THE GROWTH OF THE POPULATION OF BOSTON.

BY **FREDERICK A. BUSHÉ.**

The rapid growth of modern cities, particularly American cities, has been the subject of much comment. The discussions have ordinarily been of a general nature, treating the rise of a large number of cities from the standpoint of the modern tendency toward centralization, but giving little idea of the actual phenomena connected with their growth. This inquiry is an attempt to review the more important details connected with the growth of a particular city, with due regard to the various factors which have contributed toward it. The increments from migrations are so varied in their character that account must be taken of them all in order to obtain an adequate conception of the significance of the growth. Moreover, in many cases, they are the chief sources of increase. During the decade 1880-90 the total population of New York increased 26 per cent, while her foreign elements increased 34 per cent; the population of Philadelphia in the same time increased 24 per cent, and the foreign elements 32 per cent. The population of Boston during the decade 1885-95 increased 27 per cent, the foreign population 35 per cent, and the elements, found principally at the North End, composed of Italians and Russian Jews, increased 421 per cent.

Boston, either on account of its early history, or on account of certain traditions connected with it, is often thought to be a more purely American city than many others. While other cities have become cosmopolitan, or even distinctively foreign, Boston is believed to have preserved to a greater extent its old American character. Yet a recent analysis of the population of Boston, embracing three generations, estimates the nationalities as follows:—¹

Irish,	220,000	French,	10,000
"Old Americans,"	80,000	Scandinavians, .	10,000
Scotch,	35,000	Negroes,	10,000
Jews,	30,000	Portuguese, . . .	4,000
English,	30,000	Chinese,	1,000
Germans, not Jews,	20,000	Various,	17,000
Italians,	20,000		<hr/> 487,000

Even allowing for corrections in these figures the estimate is sufficiently near the truth to show that Boston is not the Puritan town which it once was. Yet an analysis of its population may show that it is still a representative American city.

It was not until the present century that the character of the population became greatly effected by the addition of foreign elements. The inhabitants of Boston during the eighteenth century were primarily of English origin, modified somewhat by Scotch, Scotch-Irish, and French Huguenot elements. There was also a larger proportion of negroes then than now. In 1752 the negroes numbered 1541, and represented nearly 10 per cent of the total population. This seems to be the largest percentage of negroes which the city has ever contained. Over half of them were slaves. With the gradual abolition of slavery, the number of negroes in the city decreased until in 1790 there were only 766. From this time on they slowly increased, but did not surpass their former numbers until near 1820. During the next forty years their numbers were almost stationary, and in 1860 they

¹ William A. Leahy, *Boston Transcript*, Jan. 12, 1895.

were reduced to 1 per cent of the population. They now form about 2 per cent.

The first distinct record which we have of any immigration into Boston other than English is in 1652, when the ship "John and Sara" arrived, bringing 272 Scotchmen,—Cromwell's prisoners, who were sold into service.¹ It is not probable, however, that the city was entirely English even then. Other Scotchmen must have resided here at the time, for the Scots' Charitable Society was established in 1657 with twenty-six members. The immediate need which caused the formation of this society seems soon to have passed, for no further meetings were held until 1684, when new rules were adopted and signed by twenty-eight "residents of towne & countrie" and by thirteen "strangers."² The fact that "strangers" constituted a portion of the membership makes it impossible to ascertain from the list how many Scotchmen were residents of Boston, yet from indirect references we may conclude that they made up but a very small proportion of the population. The Scotch, however, were probably the most important non-English element in the town at this period. There are records of a few Irish in Boston during the seventeenth century; but the strong religious prejudice which existed tended to discourage the immigration of Catholics, whatever their nationality.³ In 1655 a number of Irish were scattered throughout New England and sold into service, as the Scotch had been before; and some of them settled in Boston.⁴ If these Irish were Catholics at first, they did not long continue in the old faith. Fitton says of them: "Under the penal laws, deprived of all religious instruction, their children grew up Protestants."⁵ The position of those two nationalities is indicated to some extent in the early town

¹ Winsor, "Memorial History of Boston," vol. iv, p. 659.

² "The Scots' Charitable Society." Edition of 1878, p. 31.

³ In 1647 Jesuits were prohibited by law from entering the colony. "Colonial Laws of Mass." Edition of 1890, p. 158.

⁴ See Drake's "History of Boston," p. 342.

⁵ James Fitton, "Sketches of the Establishment of the Church in New England," p. 75.

records. Beginning with 1652 Scotch¹ or Irish nationality is occasionally designated as in the following extracts:—

"1652. John Stark, Scottishman, servant to Lieut. William Hudson, died 22nd, 3rd month."¹

"1656. Edward Cousins of Pulling Point, and Margaret Bird, an Irish maid, servant to John Grover of Rumney Marsh, were married."²

"1658. 26 of 5th, Margaret Noriss, an Irishwoman, is admitted into the Town, and David Faulkoner is bound to secure the Town (from any charges as respecting her), in a bond of seven pound."³

During the eighteenth century the immigration was chiefly of the Scotch-Irish from Ulster, which in some ways reinforced the Scotch settlement in the colony. Samuel Swett Green, in speaking of the Scotch in Ireland, says that they intermarried somewhat with the Huguenots and Puritan English, but in the main kept their Scotch characteristics.⁴ It was not until after these Scotch-Irish reinforcements arrived that a Scotch Presbyterian church was established in Boston. The Scotch-Irish emigration started about 1717, when, according to Lecky, their leases began to fall in, and rents were doubled or even trebled.⁵ The next year five small ships brought one hundred and twenty Scotch-Irish families—seven hundred and fifty persons—to Boston. It was from these families that the Scotch-Irish settlements at Worcester and Londonderry, N. H., were made. Probably not one-quarter of them remained in Boston. The Scotch-Irish immigration continued without interruption during the first half of the century, and was also noticeable from 1771 to 1773; but it was directed chiefly to the middle Atlantic States. Few Scotch-Irish settled in Boston, for it appears that they were not so hospitably received here. The Scotch also seem to have increased very slowly during the century; and at the time of the Revolution nearly all the resident members of the Scots' Charitable Society retired to

¹ "Births, Baptisms, Marriages, and Deaths, 1630-1699," p. 37.

² *Ibid.*, p. 58.

³ "Boston Records, 1634-1660," p. 168.

⁴ "The Scotch-Irish in America," p. 6.

⁵ *Ibid.*, p. 7, note 1.

Nova Scotia.¹ Many returned after the war was over, and when the society started again it had about twenty members.

The French Huguenots have a unique place in the history of Boston, but they did not long exist as a distinct nationality. In 1686 fifteen French families, comprising about eighty persons, arrived in Boston in a destitute condition.² They received a sympathetic welcome from the Puritans. A few more families arrived soon after, and they built a little church on School Street. During the eighteenth century their numbers slowly diminished. Some left the colony and others intermarried with the English, so that in 1748 the communicants of the church had been reduced to seven. From the first, the French showed a natural tendency to assimilate with the English; but at this time it seems to have been unwittingly hastened by the tedious discourses of their minister, Andrew Le Mercier, for it was complained that he had driven all their young people to other churches.³ The church dissolved, and with its dissolution their history as French Huguenots ceases; but such names as Bowdoin, Sigourney, Dupuis, Faneuil, Brimmer, and Revere remind us of what they were as Bostonians.

The Scotch and Scotch-Irish did not assimilate with the English with the same readiness as the French Huguenots. Within a short time after their arrival they appear to have incurred the dislike of the English, and marriages between them occurred only among the lowest classes. It has been said that the Scotch had much in common with the Puritans, and their very presence in Boston during the seventeenth and eighteenth centuries is sufficient to prove this. Yet there were some differences which, for a long time, kept them from coalescing. The Scotch of the eighteenth century were very independent in their opinions, and they were rigid and formal in their religious observances even for their own time.

¹ "Scots' Charitable Society." Edition of 1878, p. 151.

² Winsor, "Memorial History of Boston," vol. II, p. 250.

³ Winsor, "Memorial History of Boston," vol. II, p. 254.

Furthermore, according to Professor Perry,¹ any intimate relationship between the two peoples was prevented by the excessive dislike on the part of the Scotch for the use of water, either externally or internally. They may have been heedless of the first fault, but in their crowded church services it would certainly become evident to an English observer that they ranked cleanliness very far below godliness. The second weakness seems to have been recognized when the Scots' Charitable Society found it necessary to adopt the rule: "That no wine or strong drink be drunk at the charge of the charity of the Society, but beer or cyder only during the time of the meetting on Business."² Their assimilation, however, though deferred, was finally realized; and the fact that the Scotch Presbyterian church, established in 1729 on Long Lane (now Federal Street), is now the Arlington Street church, shows that this assimilation has been thorough.

The immigration from Ireland during the eighteenth century was not confined entirely to the Scotch. Some Catholic Irish, though probably a small proportion, also emigrated. In 1737, when an exceptionally large immigration into Boston took place, the Charitable Irish Society was organized. This society was formed by the Scotch-Irish, and it seemed to have been intended primarily, but not exclusively, for the assistance of their own brethren, as it was for some years a rule of the society that no Catholic should be eligible for office.³ This rule would imply that there were some Catholic-Irish in the town at this time. And the following extract of March 20, 1732, from the *Weekly Rehearsal*, confirms this assumption:—⁴

"We hear that mass has been performed in town this winter by an Irish priest among some Catholics of his own nation, of whom, it is not doubted, we have a considerable number

¹ "Scotch-Irish in New England," p. 41.

² "Records of the Society," May 2, 1738.

³ "Charitable Irish Society," Article 8 of the original records.

⁴ This extract was called to my attention by Hon. Samuel A. Green of the Massachusetts Historical Society.

among us." How many "a considerable number" of Irish would be in the mind of a Bostonian of 1782 is entirely conjectural. It certainly must have been microscopic, as compared with the number which those words would imply at the present time. It is safe to assume, at least, that there were not a sufficient number to warrant the settlement of a priest in the town. There may have been a larger number at the middle of the century than there was after the Revolutionary War, for the population of the town as a whole was decreasing during that period. But nothing definite is known concerning their numbers, until the settlement in Boston in 1788 of their first priest, Father de la Poterie. At that time there were about one hundred Catholics in the town, about thirty of whom were Irish and the remainder French, Spanish, and Americans.¹ Strangely enough the Catholics were then meeting in the little French Huguenot church on School Street. In 1748 the Huguenots had sold this church with the express provision that it should be "for the sole use of the Protestants forever." It is one of the ironies of fate that this should have been the first church in Boston to be used for Catholic worship. The anti-Catholic sentiment, however, seems to have disappeared at this time; and in 1800, when the Catholics built their first church, the Protestants generally contributed toward it.²

In 1790, when the first national census was taken, the population of Boston was only 18,320, having hardly recovered from the effects of the war. The contour of the town followed very nearly the original shore line. The north end of the town, divided from the rest by Mill Creek (now Blackstone Street) was the most populous district.³ At the first enumeration of the population in 1722, this small district contained 4549 persons, which was not quite one-half of the total

¹ See James Fitton, "Sketches of the Establishment of the Church in New England," pp. 80, 87.

² See James H. Stark, "Antique Views of Boston," p. 331.

³ A special census of Boston taken in 1789 gives the population for various sections of the town.

population. In 1789 it was estimated to contain 5848 inhabitants,—about one-third of the whole. It now contains between eighteen and twenty thousand.

Although the North End had been the most desirable residential district, a part of the West End, and what is now Washington Street, were at this time occupied by equally well-to-do families.¹ There was no definite separation of nationalities, although the Scotch and Irish, both from their occupations and location, held on the whole a somewhat inferior social position. Wm. McKay, gentleman, lived on Fish Street (now North Street); but Wm. McNeil, rope-maker, living on Cow Lane, Fort Hill, was perhaps more nearly representative. Nearly all of the Puritan churches were located at the north end of the town, but the Scotch Presbyterian church was on Long Lane, and the new Catholic church was built on Franklin Street in the south-eastern part of the town. The negroes had their headquarters on Webster Avenue, until they moved to Belknap Street (now Joy Street) in the early part of this century.²

The population of Boston increased rapidly during the early part of the century. In the first quarter of the century it increased 133 per cent, from 24,937 to 58,281.³ One of the most noticeable changes in the population was in the increasing proportion of males to females. The results of the war and the general business stagnation had left the proportion of females to males in 1790 as 121.86 to 100. By 1825 the number of females to 100 males was reduced to 101.78. Foreign immigration doubtless helped to effect this change, for during the early periods of immigration the males greatly outnumbered the females. Nevertheless, the chief factor in the change must have been the influx of persons from other parts of the United States.

¹ See the Boston Directory for 1789.

² See E. G. Porter, "Rambles in Old Boston, New England," p. 229.

³ The increase in population, caused by the annexation of South Boston in 1804, may be practically disregarded, as it contained, according to Shurtleff, only ten families when annexed.

It is impossible to make an accurate estimate of the part which immigration played in the growth of Boston previous to 1820. That nearly all of the foreigners living in Boston in 1845 came after this time is shown by the fact that only eighty of the children of foreign parents were then over twenty years of age. Emigration to the west and other causes may have acted to reduce this class, however. For several years following the Revolution immigration into the country was small. Adam Seybert estimated that from the close of the Revolution to 1806 from four to six thousand persons per year emigrated to this country, and his estimate is accepted in the official returns. From 1806 to 1816 immigration was interrupted on account of the unfriendly relations existing between England, France, and the United States. At the close of the War of 1812 immigration began to assume greater proportions. It is estimated that from fifteen to twenty thousand per year arrived in this country between 1816 and 1820. Although this is not a large number compared with six hundred thousand, and even more, which have come in later years, it was remarkable for that period.

The extent of emigration appears to have alarmed some European countries and various devices were tried to lessen it. England, finding that emigration could not be stopped, endeavored to direct its course to her own colonies, but met with little success. The extensive immigration into the United States by way of British America seems to show that England's inducements to settle in her colonies were accepted by the emigrants only in part. In 1817 a British ship with 204 passengers on board, bound for St. Johns, N. B., arrived in Boston. The passengers not wishing to go to St. Johns overpowered the crew and brought the ship to Boston.¹

Immigration during this early period was chiefly from the British Isles, Germany, and France; and it appears to have been of a very desirable kind. Many were farmers and artisans who were possessed of some means. They frequently

¹ *Niles' Register*, vol. xiii, p. 143.

brought their own implements with them, and tended to settle in the country, rather than in the towns. It required a considerable sum for a man to emigrate with his family at that time, and the very poor were thus excluded from coming. In 1816 a London paper said that the cost of passage to America was £10, each ship taking from fifty to eighty passengers.² After 1820 more assistance was given to emigrants, and occasional reference is made in *Niles' Register* to the arrival of destitute Irish passengers.

It was not long before European countries discovered this means of getting rid of certain undesirable elements. In 1882 Niles writes: "Many persons are leaving England for America, and several cargoes of paupers may be expected soon to arrive in the United States. Should we not return this compliment by sending a few cargoes of worn out negroes to England?"

According to the official returns the immigration from 1820 to 1826 amounted to only about ten thousand per year; but this figure is doubtless too small, for the returns at first were very imperfect. The immigration from 1830 to 1840, although varying from year to year, shows a fairly uniform rate of about sixty thousand per year. About three thousand per year during this decade and one thousand per year during the preceding decade came to the Boston port. We have no definite knowledge of the contribution which immigration made to the population of Boston previous to 1845; but it is possible to estimate it approximately. The censuses of 1820, 1830, and of 1835 give the aliens¹ in Boston as 1752, 3468, and 4606, respectively. Now the proportion of aliens to the total foreign population has been a steadily decreasing one, owing to the increase of female immigrants. From later censuses the general rate of this decrease may be ascertained, and then, by simple proportion, the roughly approximate

¹ *Niles' Register*, vol. x, p. 346.

² Aliens are foreign born males of voting age who have not been naturalized.

ratio of the aliens to the foreign born for the earlier periods.¹ This method makes the foreign population of 1820, 5161; of 1830, 11,381; of 1835, 15,883. There are two more ways of making estimates of the foreign population, which, though less direct, will give useful auxiliary figures. The foreign population of 1845, according to the census returns, was 27,104. Now this element may have grown at the same rate as the total population of the city, or it may have grown according to the rate of foreign immigration into Boston. Distributing this number according to the growth of the total population since 1810² would give a foreign population in 1820 of 5421, in 1830 of 13,362, in 1835 of 19,185, in 1840 of 20,599.

If distributed according to the rate of immigration into Boston since 1820, and assuming the foreigners in 1820 to be 5000, the foreign born would number 8586 in 1830, 12,073 in 1835, and 16,715 in 1840. In the second estimate, *i. e.*, according to the rate of increase of the total population, the figures for 1830 and 1835 are presumably too large, because the country people contributed to the growth of the city during these periods in greater proportion than the foreigners. And in the third estimate the figures for 1830 are presumably too small, for the official returns have been used for that period, which, as has already been said, are deemed unreliable. The first estimate, then, which gives intermediate figures, is the most nearly accurate. And it may be said that in round numbers there were about 5000 foreigners in the city in 1820, 11,000 in 1830, 16,000 in 1835, and 20,000 in 1840. These figures give a gradually increasing ratio of the foreign popu-

¹ The best proportion which I can get for this purpose is 1890 : 1875 : : 1845 : 1830, the actual figures being 16.55 : 19.38 : : 26.02 : [30.47]. From this the percentages in 1820 and 1835 are found to be 33.94 and 29, respectively. This is of course a rough estimate on the supposition that the decrease was regular. As later censuses have shown a fairly uniform decrease it seems necessary to use some figures slightly larger for earlier periods.

² There were, it is true, some foreigners in Boston before 1810; but, as has already been pointed out, the small number of persons of foreign parentage in 1845 who were over twenty years of age goes to show that there were very few before that time. At any rate it would not be safe to go back further than this in distributing the foreigners according to the growth of the city.

lation to the total population as follows: 1820, 11 per cent; 1880, 18 per cent; 1885, 20 per cent; 1840, 23 per cent. In 1845 they formed 24 per cent of the total population. In New York there were 128,492 foreigners in 1845, or 34 per cent of the total population; and in 1885, judging from the number of aliens, the foreigners formed about 21 per cent of the total population.

The most interesting period in the growth of Boston occurs after 1820. Between this time and the middle of the century Boston evidently saw successive tides of business prosperity and depression which effected its growth as in no other period of its history. The growth of the city by ten-year periods was comparatively uniform; but by five-year periods the growth fluctuated in the following curious manner: —

For 1820-25 the population increased 34 per cent.

" 1825-30	"	"	"	5	"	"
" 1830-35	"	"	"	28	"	"
" 1835-40	"	"	"	8	"	"
" 1840-45	"	"	"	34	"	"

The conclusion which would first suggest itself from these figures is that either the city censuses were too large or the national censuses were too small, and certain proof cannot be given to the contrary. But a careful analysis of the returns shows that some fluctuation in the growth of the population during these periods actually took place.

There were certain indications that the early local censuses were not unduly large. In each of the years 1840, 1850, and 1855 two censuses were taken. In 1840 the national census was much larger than the city census, owing, as has been conclusively shown, to an error in the national census.¹ After correcting this error very little difference is found to exist in the results of the two censuses for any of the three years. The greatest discrepancy occurs in 1850, when the State

¹ See "Census of Boston, 1845," p. 7.

census exceeded the National census by 1907. This, however, makes less than 2 per cent difference in the growth of the population for the five years. In 1837 a special census was taken for the purpose of apportioning representatives. It would be supposed that of all the censuses this would be most apt to be excessively large. But it gives an increase which is only proportionate between the returns of 1835 and those of 1840.

Such rapid growths in the population as are indicated by the table could be made only by extensive migrations from the country. And a migratory population sufficiently large to account for the extraordinary growth of the city certainly existed, for in 1845 over 46,000 of the inhabitants of the city had been born in other parts of the United States. And it may be added that one-half of the inhabitants over twenty years of age were unmarried. Furthermore, business conditions were such as to attract the migratory population most strongly at those periods in which the city censuses were taken, and the business conditions were least attractive at about those years in which the national censuses were taken. This is indicated by the returns for the exports and imports, by the valuation of the property, and by the bank deposits and discounts for successive years.¹

Such other statistics as are found in the censuses themselves tend to confirm the first figures which indicate irregular growths caused by migrations. First, it is significant that, during the periods of greatest increase, persons between the ages of 16 and 45 years (which would include the natural migratory age) increased more rapidly than the total population; and second, the males increased much more rapidly than the females. These facts are shown by the following table: —

¹ These may be found in the Appendix to the "Census of Boston, 1845."

Year.	Percentage of Total Population Between Ages of 16 and 45 Years.	Number of Females to 100 Males.	
		Total Population.	Between Ages of 16 and 45 years.
1820	51.56	106.99	104.16
1825	55.72	101.78	95.50
1830 ¹	52.41	111.43	109.24
1835	56.86	103.58	98.09
1840 ¹	52.68	108.02	110.65
1845	58.35	101.03	97.47

From 1820 to 1825 that part of the population between the ages of 16 and 26 years increased most rapidly; and from 1840 to 1845 the greatest increases occurred in that part of the population between the ages of 30 and 50 years. In both cases persons included in the ages mentioned formed about one-fifth of the population and contributed about one half of the increase. It will be seen that the most noticeable increases of males over females occurs between the ages of 16 and 45 years; but a considerable change takes place in the total population.

The only external evidence which bears upon this phenomenon is found in the number of the polls, which can be ascertained for each year.² The increases of the polls for the five-year periods, as will be seen by the following table, corresponds roughly to the increases of the population, and hence seems to confirm the facts given in the census returns:—

1820-25	the polls increased	49.29	per cent.
1825-30	" " "	10.94	" "
1830-35	" " "	23.61	" "
1835-40	" " "	9.31	" "
1840-45	" " "	37.24	" "

The increase of the polls, however, corresponds less closely to the increase of males of taxable age as given in the census reports. Throughout the entire period the polls show less

¹ The ages for these years are between 15 and 40, which would make the percentage of the total population a little too small. On the other hand, the number of females to 100 males is also too small, for their proportion to males between the ages of 40 and 50 is much larger than this.

² The polls are given on p. 59 of the Appendix to the "Census of Boston, 1845."

fluctuation in their growth, the chief difference being in 1830. This may indicate errors in the census reports; but it could account for only a part of the irregularity in the growth of the population. Shattuck, in remarking upon these peculiar fluctuations, says: "During the year 1825 many mechanics were required to make improvements near Faneuil Hall Market, and to build up portions of the city destroyed by fire."¹ Now, as the polls included only about two-thirds of the male population of corresponding age, it is quite possible that temporary residents of the city were enumerated in the censuses but were not taxed. If, however, allowance be made for errors in the censuses to the full amount indicated by the figures for the polls, there still remain considerable fluctuations in the population, which it seems evident is due to the migration of persons from the country to the city.

It is interesting to note that New York shows, though in less degree, similar fluctuations in the growth of its population during these periods:—

1820-25	New York	increased	33	per cent.
1825-30	"	"	21	" "
1830-35	"	"	33	" "
1835-40	"	"	15	" "
1840-45	"	"	31	" "

In 1845 we get for the first time an accurate idea of the composition of the population from the report of Lemuel Shattuck, a local statistician and genealogist, on the census of the city taken in that year by authority of the City Council. This census was much more exhaustive than any previous one had been, and it even touched upon a wider range of subjects than any succeeding census has done.² The foreign born, as has already been said, numbered 27,104 or 23.70 per cent of the population, and their children numbered 10,185. Although the foreigners had been increasing rapidly since 1840, this was not a comparatively large foreign population. The most noticeable feature in it was the num-

¹ "Census of Boston, 1845," p. 27.

² This report contains also a review of previous censuses of the city.

ber of inhabitants who were born in other parts of the United States. They numbered 46,186 and made up 40.88 per cent of the total population, exceeding by more than 5000 the total number of persons born in Boston. This suggests what the composition of the population may have been for those earlier periods which have already been considered. Shattuck remarks upon it as follows:—

“The facts confirm the truth of the remark often made, that a large majority of the active business men of Boston are from the country,—men who have come to this metropolis to seek their fortunes, bringing with them the economical habits, the industry, the energy, and the perseverance which are peculiar to the people of the interior towns of New England.”¹ Although this element has since steadily increased in numbers, its proportion has decreased, until in 1895 it formed only 22.25 per cent of the total population. The fact which follows this is equally interesting. Only 80,891, out of a population of 114,866, were born in Boston of American parents. About two-thirds of these, moreover, were minors, showing that many of them were children of persons born in other parts of the United States, so that only 9.69 per cent of the population were old Bostonians of more than twenty years of age.

Important changes had taken place in the distribution of the population since the beginning of the century. The North End had long since lost its social prestige, and the eastern part of it was thickly inhabited by persons of foreign birth. The Fort Hill district also was beginning its decline, there being fewer American inhabitants here than in 1840. Beacon Hill perhaps was the most fashionable part of the city. The South End had then hardly become a popular residential section. The district in the South Cove and that in the West End near the north Union Station had just been filled in and made ready for occupancy.

¹ “Census of Boston, 1845,” p. 37.

That part of the population born in the United States but not born in Boston were scattered pretty well throughout the city. They were most numerous in the West End, and they tended to occupy the same general district with persons of Boston birth, rather than with those of foreign birth.

The foreign population was found in the greatest numbers in the eastern part of the North End, which was ward 2, and in the eastern part of the Fort Hill district, which was ward 8. Wards 5 and 6 in the West End had the fewest inhabitants to a house (8.4), while wards 2 and 8, before mentioned, had the greatest number (17.79 and 19.15, respectively). A portion of ward 8, containing 3181 inhabitants, was much more densely peopled. The dwelling houses in this section, many of which had stores within them, contained on an average 37 persons. This is certainly an extraordinary condition of affairs. Shattuck could hardly have exaggerated when he said: "A more densely populated locality is scarcely to be found in any country." Ward 6, which is the most densely populated ward at the present time, contains only 15.03 persons to a house, being easily surpassed by two wards in 1845. The average number of persons to an occupied house for the whole city at that time (10.57) was greater than is that of any city in the United States at the present time excepting New York, which averages 18.52. Aside from this extreme overcrowding in certain sections, the general sanitary conditions were much worse than they are at the present time. Less than one-third of the houses in the city, and none of the houses in the North End, took aqueduct water; and many houses were not connected with the city sewerage system.

The places of birth of the foreign population are not given in this report; but in round numbers there were 30,000 Catholics in Boston in 1845, and from later figures it seems certain that 18,000 out of the 27,104 foreign born were Irish. From the immigration statistics the British Americans would appear to have been the next most numerous, and the English and the Germans come next with about equal numbers.

This is also the order in 1855, when the separation of nationalities is made for the first time in the census returns.

The year 1845 closes what may be considered to be the first period in the history of foreign immigrants in Boston. It includes the small and rather obscure beginnings of the eighteenth century, together with the somewhat larger and more regular additions which occurred in this century after the war of 1812. Before the next census was taken a migratory movement had commenced, which changed entirely the complexion of the population of this city and effected to a considerable extent the population of the entire country. This was the migration caused by the Irish famine of 1846. The immigration statistics tell the story of this movement for the country at large. The immigrants from Ireland for the decade 1830-40 numbered 207,881; for 1840-50, 780,719; and for 1850-60, 914,119. In the next decade their numbers drop to 485,788. The immigration was most marked at the ports of New York and Boston. In 1844 59,762 passengers arrived at New York; in 1850, 221,713; and in 1860, 111,461. At Boston 6355 passengers arrived in 1844, 31,508 in 1850, and 8807 in 1860.

During the decade 1845-55, while the total population of the city was increasing 49 per cent, the foreign population increased 130 per cent, or in absolute numbers 35,253. This increase was very largely Irish, and probably up to 1850 it was almost entirely so. From 1845 to 1850 the increase in the foreign population made up the entire growth of the city, and, indeed, even more, for the American population in those years decreased 2.27 per cent. During this period of immigration the physical condition of the inhabitants had been growing worse rather than better. A change in the ward lines, which occurred in 1850, makes it impossible to compare the conditions of various sections in 1855 with those of 1845; but the average number of persons to a house for the city had increased somewhat. The census reports are very suggestive of the tenement conditions existing at this time. George Adams, who had charge of the census of 1850,

mildly remarks: "Permit me to suggest that it is desirable to discontinue as far as possible *cellar* residences. These places are damp and poorly ventilated; they are regarded by medical men and others as unhealthy, increasing the amount of disease and death among the occupants, and as the sources of contagion which spread to other portions of the city."¹ A more vigorous protest is made by Dr. Josiah Curtis in 1855. In calling attention to the death rates in the different wards, which varied from 1.44 per cent in the West End to 8.07 in the North End, he said: "No one will be surprised at these facts who will take the trouble to visit the abodes, many of them cellars, and nearly all crowded with a dying mass of human beings, which occupy the low land, much of it redeemed from the water, that lies in the northerly, easterly, and southerly sections and suburbs of Boston. They are equal to anything we have ever been able to discover in European cities."²

By 1855 the foreign born had become more numerous in the North End and in a part of the South End, where they displaced the Americans. In 1850 there was shown to be an increase of inhabitants even in ward 8, but a slight decrease had occurred in ward 2. In the South Cove and in the adjacent district of the South End the foreign born more than doubled their number between 1845 and 1850. Three Catholic churches were erected or purchased within five years to accommodate the Catholic-growing population of this locality.³ The greatest increase of population, both native and foreign, however, occurred in the outlying districts—South Boston, East Boston, and the extreme South End. It was during this period that the Americans moved from the more crowded sections in the eastern part of the city. The movement of the population is well illustrated by the changes which had to be made in the city directory. The compiler of the directory for 1858 writes: "A great change has taken place in Boston during the last five years of our directory

¹ "Census of Boston, 1850," p. 15.

² "Census of Boston, 1855," p. 58.

³ See Winsor, "Memorial History of Boston," vol. III, pp. 528, 530.

experience. The number of names erased in that time is 48,147, and the number added is 56,207." These were double the number of changes which had occurred in any five years previous to the Irish famine.

The growth of the more important nationalities from this time on may readily be seen by referring to the chart. The curves refer in each period to the present territory of Boston.

The growth of the foreign elements since 1855 shows no such remarkable feature as it did previous to that date, as will be seen by the accompanying table, which represents the growth of the city and of the suburbs for five-year periods since 1850. Although the absolute increase in a decade has been as great in two instances, since then the percentage of increase has of course been much less. During the Civil War there was only a very small increase, whether in the foreign elements or in the total population; but from 1865 to 1875 there was a marked increase in all the nationalities. The actual increase was 35,877, which was somewhat larger than during the previous Irish immigration, yet the percentage was only 41, as compared with 180 for the previous period. The entire population of the city increased 27 per cent in the same time.

From 1875 to 1880 the total foreign population actually decreased by 5.8 per cent, and nearly all the various nationalities, excepting the British Americans, decreased. This is the only period of actual decrease in the foreign population, and it is difficult to say whether it was caused by emigration

Years.	Actual Increase of City.	Percentage of Increase of City.	Percentage of Increase of Foreigners.	Percentage of Increase of Suburbs. ¹
1850-55	33,920	18.55	.....	.....
1855-60	30,790	14.21	3.19	26.15
1860-65	21,157	8.53	3.60	9.83
1865-70	21,223	7.90	13.66	33.06
1870-75	52,070	17.96	24.57	23.08
1875-80	20,920	6.12	-5.88	11.19
1880-85	27,554	7.59	16.11	19.38
1885-90	58,064	14.88	18.66	26.15
1890-95	48,443	10.80	14.05	25.42

¹ The suburbs are those within a radius of eight miles of the State House and include Cambridge, Chelsea, Everett, Malden, Medford, Somerville, Arlington, Belmont, Brookline, Melrose, Revere, Watertown, Winchester, and Winthrop.

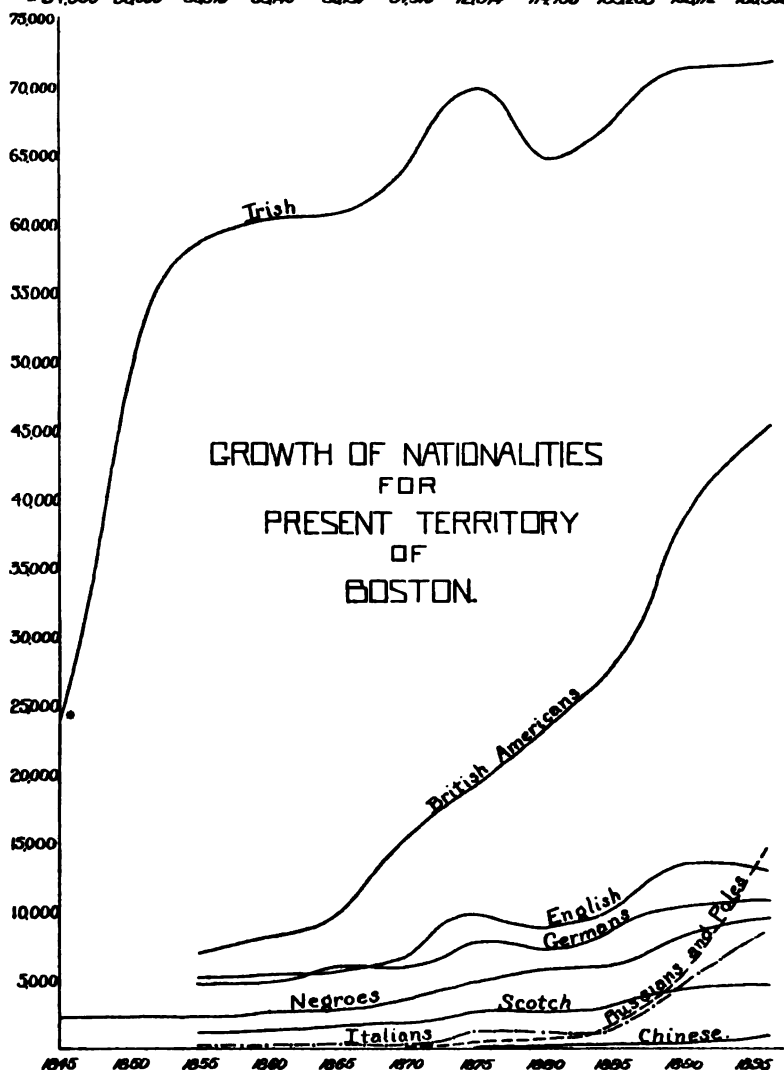
or by a decrease in immigration. The total immigration into the country fell off from 450,000 in 1873 to 120,000 in 1878, and it is quite possible that the immigration into Boston should have fallen so low that the death rate was sufficient to bring about this reduction in five years. But more or less emigration is taking place continually, and probably the decrease should be accounted for partly in this way, especially in the case of the Irish, who decreased 7.2 per cent during that time. A large increase in the foreign population has again occurred during the last decade. This in numbers surpasses the increase of any previous decade, but the proportion is less, being 35 per cent. The increase was greater between 1885 and 1890 than between 1890 and 1895.

The growth of Boston's suburbs, especially within recent years, has been closely associated with the growth of the city. It will be noticed from the table that the greatest growths of the suburbs have usually taken place contemporaneously with the greatest growths of the city. The population of the suburbs given in the table is 290,902, which makes the gain of 25.41 per cent for the last period 58,956, or 10,513 more than the growth of Boston for the same time; and during the last decade their growth has exceeded by 519 the growth of Boston for the same period. It might be supposed that in the suburbs at least the population would be pretty thoroughly American; but during the last ten years the foreign born in these suburbs increased 77 per cent, leaving 81 per cent of their population foreign born, as against 36 per cent in the city.

For the last forty years the growth of Boston itself has been confined chiefly to the outlying districts. Since 1845 Roxbury has grown from 18,929 to 92,088, South Boston has grown from 10,020 to 67,913, and East Boston from 5018 to 39,889. But that part of the peninsula which lies north of Pleasant Street has decreased in population from 80,967 to 67,968.¹

¹ The territories compared here are not identical; but the figures for the present time apply to a slightly larger area, hence the actual decrease has been somewhat greater than this.

	1845	1850	1855	1860	1865	1870	1875	1880	1885	1890	1895	1900	1905
Total Population—	148,078	182,786	214,708	247,496	265,626	289,049	311,319	352,853	389,383	418,477	436,320		
Total Foreign Born—	84,000	152,000	89,570	83,440	88,137	97,940	121,574	114,798	133,235	138,172	150,338		



* Estimated.

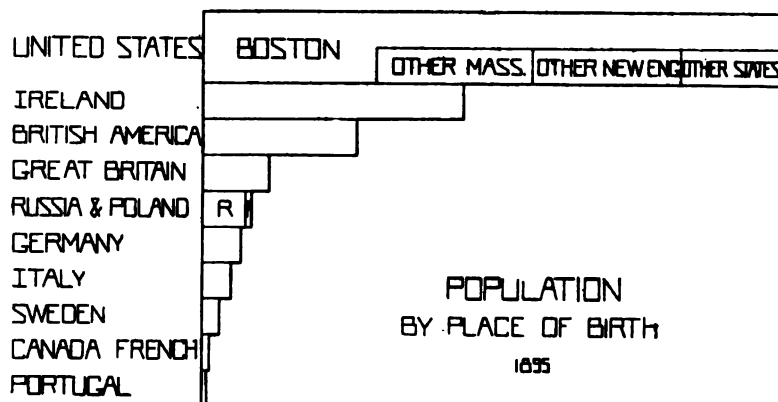
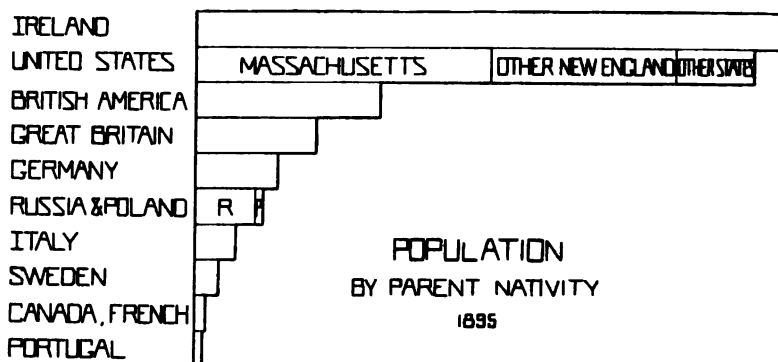
GROWTH OF THE LEADING NATIONALITIES SINCE 1855 FOR THE PRESENT TERRITORY OF BOSTON.

	1845.	1850.	1855.	1860.	1865.	1870.	1875.	1880.	1885.	1890.	1895.
Irish.....	24,000 ¹	.....	58,440	60,431	60,855	63,953	69,819	64,793	67,745	71,441	71,571
British Americans.....	.....	.....	6,977	8,187	9,717	15,147	19,924	23,156	27,779	36,294	44,202
English.....	.....	.....	5,154	5,496	5,746	6,650	9,849	8,908	10,197	13,454	13,298
Germans.....	.....	.....	4,814	4,914	5,919	5,998	7,839	7,396	8,810	10,363	10,904
Negroes.....	2,160	2,323	2,369	2,584	2,643	3,728	4,969	5,873	6,058	8,125	9,472
Scotch.....	.....	.....	1,311	1,421	1,565	1,955	2,341	2,662	3,193	4,490	4,690
Italians.....	.....	.....	252	249	393	261	1,280	1,277	2,378	4,718	7,900
Russians and Poles.....	.....	.....	.....	.....	.....	266	515	782	1,854	5,269	13,300
Chinese.....	.....	.....	.....	.....	.....	.....	39	133	268	444	805

¹ Estimated.

The composition of the population has undergone a marked change since 1845. Of the four elements of the population given at that time, those born in other parts of the United States ranked first, those born in Boston of American parentage second, the foreign born came next, and the children of foreigners last. The increase of the foreign born was so rapid after the Irish famine, however, that soon after 1850 the foreigners and their children outnumbered the Americans. The children of foreigners then formed only a small part of the population. But after 1855 they increased so rapidly that in 1880 they were the most numerous element of all. A more rapid immigration since 1880 has now put the foreign born in the lead, and the order is as follows: The foreign born rank first, the children of foreigners second, persons born in other parts of the United States come next, and the old Bostonians are last.

The proportion of the various nationalities has also changed within recent years. Since 1875 the Irish have increased but little by immigration. The number of the Scotch also has remained almost stationary. But the British Americans, a large number of whom are of Scottish blood, have kept up a steady and rapid increase from the beginning. Since 1880 both the Italians and the Russian and Polish Jews have shown remarkable growths, but neither has increased so rapidly as the British Americans at certain



NUMBERS OF THE LEADING NATIONALITIES IN 1895.

	By Place of Birth.	By Parent Nativity.
Boston.....	205,932	84,282
Other Massachusetts.....	42,969	
Other New England.....	40,500	
Other States.....	27,121	
Ireland.....	71,571	168,201
British America.....	42,367	52,390
Great Britain.....	18,311	34,067
Russia and Poland.....	11,979 } 13,300	17,277 } 19,242
	1,221	1,965
Germany.....	10,904	23,441
Italy.....	7,900	11,473
Sweden.....	4,891	6,749
Canada, French.....	1,585	2,711
Portugal.....	1,215	2,128

periods, and they in turn have never approached the rate of increase of the Irish from 1845 to 1855. The Swedes have been increasing steadily since 1870, but they still form an insignificant part of the population, numbering only 4891. The types of certain nationalities have also varied somewhat. The Italians, who were at first chiefly Genoese or Northern, are now commonly from Southern Italy. Among the Jewish immigrants the Germans were at first most common, but now, although the Jews came from all parts of the world, including the isles of the sea, the Russians are the prevailing type.

The increasing numbers of the children of foreigners makes the parent nativity of chief importance in estimating the influence of immigration. The progress of persons of foreign birth, and also those of foreign parentage, in the population has been as follows:—

	1845.	1855.	1880.	1885.	1890.	1895.
Percentage of foreign born of the total population	23.70	38.88	31.63	34.14	35.26	36.30
Percentage of foreign parentage of the total population ¹ ..	32.61	52.98	63.56	67.02	67.96	70.65
Percentage of foreign born of foreign parentage.....	72.68	72.92	49.77	50.94	51.89	51.38

Between 1880 and 1890 the foreign born increased more rapidly than the native children of foreign parents, thereby regaining predominance. Immigration has increased somewhat within recent years, and it is probable also that a larger number of immigrants are single persons. At least the birth rate among the foreign elements has been decreasing. It is difficult to get accurate statistics concerning the births, but by actual enumeration in 1850 the Irish were found to be increasing 5.28 per cent, the Germans 5.64 per cent, and other foreigners 5.96 per cent. In 1845 the Irish in the most densely inhabited part of Boston were found by actual enumeration to be increasing 6.77 per cent. Although

¹ One or both parents.

this appears to have been the highest birth rate of any district in the city, Shattuck remarked: "This prodigious fecundity of our foreign population generally prevails throughout the city."

Persons of foreign parentage (one or both parents) then at the present time form 70.65 per cent of the total population, and a little over one-half of this number is of foreign birth. A comparison of the chief nationalities by parent nativity¹ is made in the accompanying diagram, and a similar diagram showing the same nationalities by place of birth is also given for comparison. The nationalities given in the diagrams represent 96 per cent of the total population in case of the parent nativity, and 98 per cent of the total population in case of the place of birth. It has already been shown that those nationalities which immigrated first, and which for a long time formed almost the entire foreign population have now become less important on account of the recent rapid growth of nationalities from southern and eastern Europe. In the comparison of parent nativities, however, it will be seen that the older nationalities still retain their predominance. The Irish have always been the most numerous of all the foreign elements, but they show an even greater predominance in comparing the parent nativities. They are not merely the largest of the foreign nationalities; but they are the largest single element in the city, surpassing by 7666 the Americans born in any part of the United States. In 1885 it appears that the Irish element exceeded the American by about twice the amount of the present excess. Persons of Irish parentage now make up 47.37 per cent of the population of foreign parentage; and they compose one-third of the inhabitants of the city.

¹ In disposing of persons of mixed parentage, in the comparison of parent nativities, I have not followed the parentage of the father nor that of the mother exclusively, but have divided them equally between the two nationalities to which the parents belonged. For instance, there were 2360 persons whose fathers were born in Ireland and whose mothers were born in Great Britain; and there are 3075 persons whose mothers were born in Ireland and whose fathers were born in Great Britain. I have therefore credited 2717 to each nationality, and have proceeded thus with every case of mixed parentage.

In comparing the earlier with the later nationalities it will be noticed that a considerable difference occurs in the relative sizes of the first and second generations. With the Irish and the Germans the second generation is the larger, persons of foreign birth forming only 43.03 per cent and 46.51 per cent, respectively, of those elements. With the British Americans, who are largely single persons, the foreign born form 80.87 per cent of the total number of foreign parentage. Between these extremes are found the Italians, and the Russian and Polish Jews, but apparently time is the only thing lacking to enable either to produce a numerous offspring. At present the foreign-born Italians form 68.85 per cent of the Italian element, and the foreign born among the Russian and Polish Jews form 68.60 per cent of that element. The only change in the order of nationalities between the place of birth and the parent nativity is for the Germans. They precede the Russians and Poles when the parent nativity is compared. And the Americans, of course, rank first when the place of birth alone is considered.

It is interesting to note that there are more persons who were born in "other States" (*i. e.*, States outside of New England) than there are persons whose parents were born in other States. The former number 27,121, and the latter 22,085. This indicates a second migration on the part of many families. Of the Americans who migrate to Boston the number having foreign parents is exceptionally large in case of persons from other States, and this is probably sufficient to account for the difference. The same thing was true in 1885.

Since 1845 the residential districts of the city have been modified in various ways. Next to the enlargement of the city's area the most noticeable change is in the increase of territory devoted entirely to business. Fort Hill was levelled in 1867, and with it the most objectionable tenement district in the city was destroyed. This section no longer contains dwelling houses. A further destruction of objectionable

tenements has been made recently in the South Cove by the erection of the new Union Station.

The movement of the population has been to the south and the west. The rapid influx of foreigners during the middle of the century caused a large number of Americans to settle in the South End, which was then a new section. It is related that in 1850 the manager of a Boston weekly refused to deliver his paper south of Dover Street, because it was so far away; and he delivered it on the street only because it was such a "popular street." Ministers and other professional men lived on Dover Street, then considered very desirable. Persons who are acquainted with that district at the present time will realize how great a change has taken place in the character of its inhabitants. Continued immigration caused an overflow of the foreign born, chiefly British Americans and Irish, into the South and West Ends, and when the streets of the Back Bay were opened in 1872 they were quickly occupied by American inhabitants of those districts.

The North End now contains the largest number of foreign born of any part of the city. Ward 6, which has the largest number of inhabitants of any ward, is the only one which contains a larger foreign than native-born population. And the native born, which comprise 48.18 per cent of the inhabitants of the ward, are largely the children of foreigners. Next to the North End ward 8 in the West End and ward 7, which includes the South Cove, contains the largest proportion of foreign born. Nearly as large proportions are also found in ward 18 in South Boston, and ward 2 in East Boston. The density of the population follows pretty closely the distribution of the foreign born. The North End is much the most densely peopled part of the city. Ward 6 contains on the average 1.28 persons to a room.¹

Persons born in the United States but not born in Boston are a less important factor in the population than formerly, but in some parts of the city they form a majority of the

¹ See "*Massachusetts Census of 1895.*"

native born. There are very few of this class in the North End or the West End. A somewhat larger number are found in the lodging houses of the South End, but they are most numerous in this district a little farther south than the population of 1845 extended.¹

A general comparison now of the populations of several large cities will disclose how far the population of Boston has marked peculiarities, and will enable us to understand better the significance of its growth. The earliest comparison which can be made is for 1860, and the latest is for 1890.

In 1860 —

84 per cent of Boston's population was foreign born.²

47	"	"	New York's	"	"	"	"
30	"	"	Philadelphia's	"	"	"	"
25	"	"	Baltimore's	"	"	"	"
45	"	"	Cincinnati's	"	"	"	"

In 1890 —

85 per cent of Boston's population was foreign born.

42	"	"	New York's	"	"	"	"
26	"	"	Philadelphia's	"	"	"	"
16	"	"	Baltimore's	"	"	"	"
24	"	"	Cincinnati's	"	"	"	"

Boston, then, is the only one of the five cities which had a greater percentage of foreign born in 1890 than in 1860. This means that a relatively larger number of Boston's foreign born has come from recent immigration, for its total population has grown nearly as rapidly as that of the other

¹ The figures showing the number of persons born in the United States but not born in Boston for each ward in the city have been kindly furnished by the Massachusetts Bureau of Statistics of Labor. As they do not appear in the regular census reports they are herewith appended. The native born and foreign born, by wards, may be found in the last State Census Report, vol. 1, p. 862.

Ward 1, . . . 4,479	Ward 10, . . . 9,757	Ward 18, . . . 4,147
" 2, . . . 2,723	" 11, . . . 6,796	" 19, . . . 2,661
" 3, . . . 2,368	" 12, . . . 9,687	" 20, . . . 5,457
" 4, . . . 3,465	" 13, . . . 2,032	" 21, . . . 6,275
" 5, . . . 3,024	" 14, . . . 3,415	" 22, . . . 4,640
" 6, . . . 2,085	" 15, . . . 2,912	" 23, . . . 3,800
" 7, . . . 3,727	" 16, . . . 3,434	" 24, . . . 5,110
" 8, . . . 4,502	" 17, . . . 3,703	" 25, . . . 4,467
" 9, . . . 5,844		

² This again is for the present territory of Boston. The percentage would have been 36 for the territory which Boston included in 1860.

cities and its foreign population has grown much more rapidly. The fact is clearly shown in the following table which gives the increases of the total population and of the foreign born during the thirty years:—

	Total Population.	Foreign Born.
Boston	81 per cent	90 per cent
New York	86 " "	66 " "
Philadelphia	85 " "	59 " "
Baltimore	106 " "	81 " "
Cincinnati	84 " "	—8 " "

Boston, again, is the only city in which the foreign born have increased at a greater rate than the total population. In Cincinnati there has been an actual decrease of 2206 in the foreign born since 1860. The exceptional growth of the population of Baltimore is partly due to the annexation of territory.

Boston did not have an exceptionally large proportion of foreign born in 1860, although the Irish, the greater part of whom had come since 1846, formed 72 per cent of the foreign population. Before the Irish immigration had spent itself, a German immigration had begun, which surpassed that of the Irish between 1850 and 1860 and contributed largely to the growth of many cities. The contributions which the various nationalities have made to the population of the United States, and to that of the several cities for the two periods, are illustrated in the accompanying tables.

In 1860 the Irish was the leading nationality in New York and Philadelphia, as well as in Boston, while the Germans led in Baltimore and Cincinnati. In New York the Irish made up only 58 per cent and in Philadelphia only 56 per cent of the foreign population, while the Germans in Cincinnati formed 59 per cent and in Baltimore 62 per cent of the foreign born. Hence, Boston had a larger proportion of her foreign population composed of a single nationality. In 1860 the first six nationalities were much more uniformly represented in the several cities, and corresponded more closely

TABLES SHOWING THE ORDER OF THE CHIEF NATIONALITIES IN THE UNITED STATES AND IN THE SEVERAL CITIES FOR 1860 AND 1890.

TABLE I.—1860.

United States.	Boston.	New York.	Philadelphia.	Baltimore.	Cincinnati.
<ol style="list-style-type: none"> 1. Ireland. 2. Germany. 3. England. 4. British America. 5. France. 6. Scotland. 7. Switzerland. 8. Wales. 9. Norway. 10. China. 11. Holland. 	<ol style="list-style-type: none"> 1. Ireland. 2. British America. 3. England. 4. Germany. 5. Scotland. 6. France. 7. Atlantic Islands. 8. Italy. 9. Sweden. 	<ol style="list-style-type: none"> 1. Ireland. 2. Germany. 3. England. 4. Scotland. 5. France. 6. British America. 7. Russia and Poland. 8. Switzerland. 9. Austria. 	<ol style="list-style-type: none"> 1. Ireland. 2. Germany. 3. England. 4. Scotland. 5. France. 6. Switzerland. 7. British America. 8. West Indies. 9. Wales. 	<ol style="list-style-type: none"> 1. Germany. 2. Ireland. 3. England. 4. France. 5. Scotland. 6. British America. 7. Switzerland. 8. Holland. 9. Wales. 	<ol style="list-style-type: none"> 1. Germany. 2. Ireland. 3. England. 4. France. 5. Scotland. 6. British America. 7. Switzerland. 8. Holland. 9. Wales.

TABLE II.—1890.

United States.	Boston.	New York.	Philadelphia.	Baltimore.	Cincinnati.
<ol style="list-style-type: none"> 1. Germany. 2. Ireland. 3. British America. 4. England. 5. Sweden. 6. Russia and Poland. 7. Norway. 8. Scotland. 9. Italy. 10. Denmark. 11. Austria. 12. Bohemia. 13. France. 14. China. 	<ol style="list-style-type: none"> 1. Ireland. 2. British America. 3. England. 4. Germany. 5. Russia and Poland. 6. Italy. 7. Scotland. 8. Sweden. 9. Portugal. 10. France. 11. Norway. 12. China. 	<ol style="list-style-type: none"> 1. Germany. 2. Ireland. 3. Russia and Poland. 4. Italy. 5. England. 6. Austria. 7. Hungary. 8. Scotland. 9. France. 10. British America. 11. Bohemia. 12. Sweden. 	<ol style="list-style-type: none"> 1. Ireland. 2. Germany. 3. England. 4. Russia and Poland. 5. Scotland. 6. Italy. 7. British America. 8. France. 9. Austria. 10. Switzerland. 11. Sweden. 12. Norway. 	<ol style="list-style-type: none"> 1. Germany. 2. Ireland. 3. Russia and Poland. 4. England. 5. Bohemia. 6. Austria. 7. Italy. 8. Scotland. 9. British America. 10. France. 11. Sweden. 12. Switzerland. 	<ol style="list-style-type: none"> 1. Germany. 2. Ireland. 3. England. 4. Russia and Poland. 5. British America. 6. France. 7. Italy. 8. Scotland. 9. Switzerland. 10. Austria. 11. Holland. 12. Wales.

to the order in the United States than in 1890. The Atlantic islands and the West Indies were formerly of some importance among the foreign countries represented in the cities. A noticeable number of Russians and Austrians were to be found in New York, and a few Italians in Boston and Baltimore as early as 1860. It will also be noticed that a relatively smaller number of Norwegians and Welsh, and a greater number of Scotch, were to be found in the cities than in the country at large.

A great change has taken place in the order of nationalities in the United States since 1860 as well as a considerable increase in the number. Ireland and Germany have changed places, and the same thing is true of England and British America. France, Switzerland, Wales, and Holland have become unimportant. Among the more recent immigrants the Swedes and the Russians and Poles are very numerous. The Italians, Danes, Austrians, and Bohemians are also important, though much less so than the Swedes and the Jews. The Jews, Italians, and French are relatively more numerous in all these cities than they are in the country as a whole, while the opposite is true of the Swedes, Norwegians, and Danes.

The most important changes in the cities have occurred in New York and Baltimore, where the more recent immigrants have attained special prominence. In New York the Germans have taken precedence over the Irish, while the Jews and Italians hold third and fourth places. The Austrians, Hungarians, and Bohemians are also numerous. Similar changes have occurred in Baltimore. The Bohemian settlement is surprisingly large here, but the Italians are relatively less important than they are in New York or Boston. Hungary, it will be seen, is represented in New York alone. The increase of the Jews and the Italians is the most noticeable change in all the cities, and in Boston it is the only change of importance. The order of the first four nationalities has remained the same here as in 1860. A large number of

British Americans and a small number of Germans have always been characteristics of the population of Boston. It will be noticed also that Boston is the only one of the five cities in which the Portuguese are represented, and the only one in which the Austrians are not represented in the first twelve nationalities. On the whole the population of Baltimore resembles that of New York, while the populations of Boston and Cincinnati are more nearly like that of Philadelphia.

The comparative influence of immigration upon these cities is shown by the following table, which gives the percentage of persons of foreign parentage (one or both parents) to the total population. A few other cities having a large percentage of persons of foreign parentage are added to those already considered.

Boston . .	67.96 per cent.	Milwaukee . .	86.86 per cent.
New York . .	80.46 " "	Chicago . .	77.90 " "
Philadelphia .	56.58 " "	Fall River . .	82.71 " "
Baltimore . .	41.67 " "	Lawrence . .	79.88 " "
Cincinnati . .	68.97 " "	Holyoke . .	82.98 " "

Milwaukee has the largest percentage of persons of foreign parentage in its population of any city in the United States. Some of the manufacturing cities of Massachusetts, however, have almost as large proportions. In 1895 in Fall River persons of foreign parentage formed 85.71 per cent of the population. By referring to the table showing the percentages of foreign born, it will be seen that Cincinnati has a much greater proportion of persons of foreign parentage than of foreign birth owing to the slight immigration of foreigners to that city during recent years. The same thing is true, to a less degree, of Baltimore and Philadelphia. In all these cities the native children of foreigners outnumber the foreign born.

It would be desirable to analyze further the population of these cities in order to ascertain the number of persons of native parentage who were born in other parts of the United

States; but, with the exception of Boston, this cannot be done except insofar as they were born in other states.

In 1860 of the native born in —

Boston . .	24	per cent	were	born	in	other	states.
New York .	12	"	"	"	"	"	"
Philadelphia	12	"	"	"	"	"	"
Baltimore .	9	"	"	"	"	"	"
Cincinnati .	25	"	"	"	"	"	"

In 1890 of the native born in —

Boston . .	22	per cent	were	born	in	other	states.
New York .	16	"	"	"	"	"	"
Philadelphia	14	"	"	"	"	"	"
Baltimore .	12	"	"	"	"	"	"
Cincinnati .	18	"	"	"	"	"	"

This seems to indicate that in the case of Boston there is a particularly large migration from the country to the city. It has been, however, a decreasing proportion in both Boston and Cincinnati. This element, composed of persons from other parts of the United States, contributes towards a large floating population, which resides in boarding and lodging houses, and which forms in Boston a very noticable part of the population. It is an interesting fact that in 1890 the number of boarding or lodging-house keepers in Boston numbered 1360; in New York, 1569; in Philadelphia, 1014; in Baltimore, 557; and in Cincinnati, 267. And in 1895 there were 44,926 lodgers and 9496 boarders in Boston.

A final interesting analysis of the population may now be made which will give some approximation to the old American inhabitants of the city. The following table gives the percentage to the total population of the native white of native parentage who were born in the State:—

Boston . .	19.83	per cent.	Milwaukee .	9.23	per cent.
New York .	13.78	" "	Chicago . .	9.03	" "
Philadelphia .	33.85	" "	Fall River .	12.68	" "
Baltimore .	37.36	" "	Lawrence .	10.55	" "
Cincinnati . .	20.98	" "	Holyoke . .	10.34	" "

The proportion of the population born in the city named would of course be considerably less; for instance, the proportion in Boston would be reduced to 14 per cent. To illustrate the meaning of the above table in round numbers, take the case of Milwaukee, which has a population of 204,468. Deduct the foreigners of two generations, the negroes, and persons who have emigrated there from other states, and it would have a population of only 18,890. This reduction for the city of New York would cause a diminution in its population of 1,306,519. The same operation would make Chicago a city of about the size of Worcester, Mass. Philadelphia, under these conditions, would be much the largest city in the United States, with a population of 354,450. Take from Boston the foreigners and their children, together with those persons who were born outside the city, and her population would be reduced to about 64,000.

From this brief comparison it may be concluded that the foreign element in Boston, considering either the place of birth or the parent nativity, is not remarkably large, although it is perhaps greater than the average. Thirteen of the fifty principal cities of the United States have a larger proportion of persons of foreign parentage than Boston has. But some allowances should be made in the case of every city for peculiar tendencies due to size and location. In the number and variety of nationalities the population of Boston presents few striking peculiarities. Its chief characteristic — the large number of British Americans — tends to simplify the problem of assimilation, for now the three largest nationalities are, at least, English-speaking. The few nationalities in Boston which were not represented in the other cities are numerically of small importance. Boston cannot be compared with other cities in every phase of her growth, but it is noticeable that the growth of the foreign born has been more recent here than in the other cities analyzed. This means a relatively smaller number of native children of foreigners than is the case with many cities, and it has also

one other consequence. It has already been noted that formerly in Boston an exceptionally large proportion of the foreign born were composed of a single nationality,— the Irish. This is no longer true; but persons of Irish parentage do form an unusually, though not an exceptionally, large proportion of the population of foreign parentage. It may also be added that the migration from country to city has been unusually large in the case of Boston. With these exceptions, it still remains true that Boston is fairly representative, at least for a northern city. The peculiarities in its population are really of minor importance. And it seems probable that the chief phenomena connected with the growth of Boston are in the main similar to those of other American cities.

WAGE STATISTICS IN THEORY AND PRACTICE.

BY ROLAND P. FALKNER.

"Consumption and production, wages, prices charged by mechanics, small traders, carriers, etc., are susceptible only of estimates."¹ This dictum of Meitzen, particularly in its application to wages, has been a stumbling block to several writers. Yet it is, from a theoretical point of view, true in the vast majority of cases; and if we would understand the nature of wage statistics and their limitations we cannot do better than study this statement.

The author is opposing statistics and estimates, and this contrast is rigorously upheld by continental authorities.² The essence of the distinctions is that "statistics," properly so-called, embrace directly *all* the phenomena within a given field, while all partial enumerations are estimates. For example, if the problem were to discover the wages of carpenters in Pennsylvania we should have "statistics" when we had combined, in whatever fashion, records of the wages of every carpenter in the State. Anything less than this, such as the choice of representative workmen in representative localities, might, indeed, give us very interesting figures capable of throwing much light upon the subject; but these figures would be "estimates" not statistics. In short, Dr. Meitzen does not pretend that every record of wages paid to individuals, such as appears in the monographs of the Le Play

¹ *History, Theory, and Technique of Statistics*, by August Meitzen, translated by R. P. Falkner, p. 183.

² In a somewhat similar discussion at the meeting of the International Institute at Bern, 1896, Professor Rauchberg of Prague voiced an opinion which I found to be very general when he said: "We must distinguish between statistics comprising the totality of cases and those which consider only types arbitrarily chosen. If we confine ourselves to the latter, the results will serve only for that part of the whole which these types represent, and they may not be adapted even to this. As to which of these this principle is preferable no one can be in doubt . . . the first system is statistics, the other is not" (*Bulletin de l'Institut International de Statistique*, 1896, vol. ix, part II, p. xcv). Dr. Rauchberg informed the writer at that time that the Austrian Bureau had in contemplation wage statistics, and that they proposed to carry their principle into practice by securing the wages of every workman in each class in any geographical region to which the figures might relate.

School, and even in somewhat larger fields of observations, are estimates, but that what are generally called statistics of wages, which pretend to give the wages in a given industry in Great Britain or any larger geographical unit, are estimates. To take an illustration nearer home, the wages recorded in the Aldrich Report are not estimates, but they are not statistics; hence their combination to give a general view of the course of wages in the United States is an estimate. When in the last issue of these publications Mr. Bullock cites the work of Mr. A. L. Bowley to refute the erroneous opinion of Meitzen he only supports the latter, for Mr. Bowley's excellent study of "Changes in Average Wages in the United Kingdom"¹ is based upon statements of wages paid in particular localities.

To push the distinction between theory and practice to the point of declining to speak of wage statistics does not seem to me under ordinary circumstances a very profitable undertaking. Language is ever stronger than the theorist, and so long as everybody continues to speak of statistics of wages it would savor of pedantry to insist that they were not in fact statistics at all but mere wage records. Yet if there is a distinction between the requirements of strict statistical theory and the methods employed in obtaining results, which statisticians and economists regard as satisfactory, it imports to know what the distinction is and just how far it furnishes a criterion of judgment which enables us to reject certain results as inadequate and accept others as satisfactory.

Statistical inquiry into wages has concerned itself with two things,—the wages at a given period and the course of wages.²

¹ *Journal of the Royal Statistical Society*, 1886, pp. 233.

² Insistence has been laid by some writers, notably Mr. Wright, on the advantages of the classified wage table. As we shall hereafter deal almost exclusively with average wages it may be well to point out here how they are related. In actual wages we may be interested in the average wage or in the range of wages. In the latter case the classified wage table is the most apt expression of the facts. If Mr. Wright has emphasized this form of expression as a notable achievement of American statistics, it is because he opposes such a classified statement of wages to the generalities which masquerade under the name of averages but which rest upon no scientific method. The validity of the average if properly attained, and its usefulness as the briefest expression of a complex mass of facts, is fully recognized by Mr. Wright. (See his article, "The Evolution of Wage Statistics," *Quarterly Journal of Economics*, January, 1892.)

It is obvious that if the first be correctly determined the second task becomes an easy one. But given such data as we actually possess the problem is more complex.

We must therefore inquire whether the actual data at our disposal conform to the strict requirements of statistical theory, and in the absence of such conformity how far they may be regarded as accurate. In theory there are many striking analogies between the statistics of wages and prices. As I have already treated the subject of price statistics in these *Publications*¹ I shall be as brief as possible in this division of my subject. What then are the requirements of statistical theory in the matter of wage statistics? They are very simple. Within the geographical unit to which the figures relate the wages of each workman in the occupation considered must be recorded. All the rest is a matter of tabulation. Whether we deem the average wages the best statistical expression of the facts, or the classified wage table more adequate, will depend upon our immediate purpose. Our data will permit either arrangement, but they must be complete. If they are thus complete, if every workman of this occupation is included and no workman of other occupations are included, then none can question the accuracy of the average wages thus obtained. If statements of average wages are contested it can only be because they are not gained in this way and that the method employed is an inefficient substitute for it. Or we may go a step further and make an industry instead of an occupation the basis of our statistics. If all the workmen in the industry within the given geographical unit are enumerated we shall be able to calculate the average wages in the industry beyond the peradventure of a doubt. And if there was any object in finding the average wages in Philadelphia as compared with Reading it could be done without any criticism as to method if the wages of every wage earner in each locality were known. Whether such computations of average wages would be use-

¹ "The Theory and Practice of Price Statistics," vol. III, 119 *et seq.*

ful would depend on the object of our inquiry. They would only show that different industries or different localities employed a higher or lower priced labor, whether by paying different rates or employing different grades.

Now, if we turn to the actual statistical data on wages, what do we find? Anything but the conditions above described. Either we find general statements which purport to give the average wages in certain occupations, or else figures of actual wages based on limited field of observation. In the latter case, for instance, we might find statistics of carpenters' wages in Philadelphia based on the wages of only a fraction of the workmen in occupation, and if we find statistics of such wages for the State they would in all probability be based on a comparatively small number of places. I have no fault to find with the facts. If practice differs from theory it is only because practical necessity has forced us into short cuts to reach approximately the same results as would be attained by the more cumbersome procedure which theory demands. Our study of actual wage statistics must concern the measure of this approximation and the methods which it uses.

Our interest in wages may attach to two things, wage rates or earnings. While they are frequently confused in popular writings I think statisticians are generally agreed that when wage statistics are alluded to the expression refers to wage rates. Whether such a consensus of opinion is universal or not it will avoid the possibility of misunderstanding to state that in this discussion wages and wage rates are considered identical terms.

In the earlier economic literature statements relating to wages usually took the form that wages of farm hands in England were so many shillings. If this meant anything at all it meant an average wage, and as such it was accepted wherever used. Investigation frequently revealed that in its original form it purported to be the average rate in a particular district, say Devonshire, and that its extension to

England was the work of a later writer. But what validity had such a figure with regard to Devonshire? Generally such statements are entitled to the weight of expert testimony. This assumes the informant to be well acquainted with the field, to have knowledge of the varying rates of remuneration and of the number who receive these rates. Provided the expert's knowledge is broad and deep enough the process by which he arrives at his result is very much akin to the method which the theoretical statistician would use to obtain the true average were he in possession of all the facts. It is a rough and ready method of obtaining the truth, but is open to the objection that it furnishes no material by which to judge the accuracy of the method. The raw material of the average is stored away in the brain of the expert, and he, perhaps, is dead. Of late years both statisticians and economists have grown suspicious of these "average wages" statements and have demanded something better. Yet for the past we are often forced to accept material which we would reject if it applied to the present. Whether for this or other reasons such statements of average wages are frequently accepted as valid. Of such a character are the figures upon which Mr. Giffen based his well-known essay on the "Improvement of the Working Classes."¹ The more detailed and careful work of Mr. Bowley is based upon the same material. Of like nature is the work of the late Joseph D. Weeks of which a large amount is published in the twentieth volume of the Tenth Census. His work for the Aldrich Committee was of a like character and was not therefore given any prominence in the report. Much of the early work of labor bureaus in the United States had no other foundation.

Midway between the statements of experts and real enumerations of wages stand such figures for average wages as are based upon an average of rates. This is a simple device but not very trustworthy. If in a given occupation we find

¹ "Essays in Finance," Second Series.

some men gaining two dollars a day and others one dollar the average wages may be one dollar and a half, but only on the supposition that an equal number is employed at each rate. How often calculations of this nature find their way into the statements of those whom we have agreed to call experts cannot be known, but it is suspected that they are not infrequent, and this suspicion only adds to the disfavor which greets such general statements of average wages.

In the second place we possess wage statistics based upon partial enumerations. The enumeration is always partial as to the occupation, and it is frequently partial as to the locality. In the last issue of these *Publications* Mr. Bullock calls attention to the partial enumeration of the various industries represented in the Aldrich Report, and he also calls attention to the fact that while the report purports to give the course of wages in the United States, all its figures are drawn from States north of the Potomac and east of the Ohio. Statements of a similar nature with respect to the number enumerated in any given occupation and the limited geographical range of the figures would hold true in a greater or less degree in all wage statistics. The highly prized work of the United States Department of Labor, which has been the model for labor statistics the world over, has based all its reports as to wages upon partial enumerations. It is a matter of common agreement that the larger the proportion of persons employed, who are represented in the statistics, the more credence attaches to the results. When one set of wage statistics are commended in contrast to another it is generally because they rest upon a broader basis. From a theoretical point of view they all fail to meet the strict requirements of statistics, and yet we do not hesitate to use them or pass judgment upon their value. What then is the nature of this judgment, and upon what basis does it rest?

Our judgment of wage statistics rests entirely upon our appreciation of conformity to law. The average wage in an occupation is the point towards which all wages tend. If

absolutely free competition fixed wages, if custom had nothing to do with the fixation of rates, we should find within the range of wages an infinite number of gradations. Those which approached the maximum and those which approached the minimum would be relatively few in number. Those which approached the average would be far more numerous. Custom and convenience fix wage rates in round numbers¹ and prevent our having as many gradations as the range would permit. None the less, within a given occupation an economic law, which is universally recognized, tends to bring all wage payments to a level. It is on this law that we rely when we attempt by statistical short-cuts to establish average wages. If such a law exists we may deduce from it two corollaries, namely, that a large number of observations, even if it falls far short of the total number of cases, will contain the average so much more frequently than the variations from it that its average may be deemed the average of the whole; and, secondly, that the wages paid under normal conditions will conform to the average.

Upon these two corollaries all actual statistics of wages rest. As to which of these is the safest basis of operations, where both are available, there cannot be a minute's hesitation. The first is largely mechanical in its workings. Every increase of the field of observation narrows the probability of an undue proportion of abnormal cases. Yet even here the second rule is applied as a precaution. If, for instance, we wish to find wages today in the iron industry we would not seek out the charcoal furnaces, even though among them we might collect a goodly number of quotations. So that in a limited enumeration based on as many quotations as are obtainable we instinctively look for normal conditions or representative establishments.

The difficulty of determining beyond question that conditions are "normal," and that the establishment is in fact

¹ "Round Numbers in Wages and Prices," by E. D. Jones, vol. v, p. 111, of these Publications.

"representative," makes us dubious of all wage statistics based on a very limited observation. None the less it must be evident that our whole effort is to obtain normal wages and to eliminate the abnormal. Two ways stand open to us; first, to so increase our observations as to throw possible abnormal rates into the background; second, to assure ourselves that the wages recorded are paid under normal conditions. Theoretically both methods are unobjectionable; practically the uncertainty of the criteria of normal conditions militates against the second method.

Are the objections to the second method such as to cause us to discard it absolutely? I think not. Cautious as we must be in its application we may rest assured that in default of better methods it will be applied. We may justly criticise its use when other methods are available. But under certain circumstances it is the best that can be done. This is especially true of all wage statistics that reach back any distance into the past. For such investigations we must take material which has been saved in the course of time and be grateful. If we are to deem all such records sporadic and abnormal they become useless, and the historical investigation of wages becomes impossible.

It may be noted that with respect to localities the idea of "representative" conditions is applied very generally and evokes no criticism. If we seek the wages of textile workers in Massachusetts we go to Lawrence, Lowell, and Fall River rather than to other localities.

The second point to which the statistical inquiry has been directed has been to the course of wages. The question assumes a different aspect as it relates (1) to the wages of a specific occupation, (2) to the wages of a given industry, (3) to the general course of wages.

In the determination of the course of wages in a given occupation there could be no question if the wages at different epochs had been determined by the theoretically correct statistical method, which, however, is never the case. As

generally some substitute for the true method has been used, it is obviously important that in each determination of wages it shall have been the same substitute. It is probable that each substitute has its own law of variation from the true average. In forming a series it seems, therefore, essential that the same methods be employed for each member. In practice, therefore, one is confronted with the question whether in the absence of a continuous series one shall take such material as is available or create a new series. The Aldrich Report chose the latter method. It took a given occupation in establishments which had been in existence for a long series of years. This required a strong emphasis on the "representative" character of the establishments, which has given rise to criticism in some quarters. This criticism is partially disarmed when it is remembered that the purpose of the report was not to discover actual wages so much as their ratios and direction of change in the period covered.

The other alternative is to take the scattered notices of wages which can be gathered together and to weld them into a continuous series. This has been done very adroitly for England by Mr. Bowley. His material was very ample but very heterogeneous. He carefully avoided comparing one locality with another. If his series of wages consisted of 1860, London; 1870, London and Norfolk; 1880, Norfolk, he adopted the expedient of establishing the ratio of change of London in 1870 as compared with 1860, and using the index thus obtained for 1870 to compare Norfolk in 1870 with 1880.¹ In few countries are the existing materials sufficiently ample to permit the use of such a method. His calculations deal with statements of average wages derived from like sources for each comparison.

The investigation of the course of wages in an industry offers again no difficulty when the theoretical requirements

¹ Mr. Bowley's method received high praise at the meeting of the Royal Statistical Society at which his paper was presented, June, 1886. A very similar process applied to prices will be found in the Aldrich Report, vol. i, p. 81.

of wage statistics are fully met. But, as we have said before, this is a condition which is not found in actual statistics. The actual course of wages in a given industry is the resultant of two forces,—changes in rates paid particular occupations, and a shifting in the relative strength of the different occupations within an industry. In actual statistics it will generally be found that at the best the available data give but a few of the occupations which the industry represents, and that in the absence of good industrial statistics in the past we know nothing very positive about the relative importance of the occupations. If we then attempt to ascertain the course of wages in a given industry it must be with a full consciousness of the limitations which the conditions impose. We have nowhere a full and complete statement of the wages of all classes of occupations within the industry but only of a portion of them. If we cannot accept these as representative then the determination of the course of wages within an industry becomes impossible.

If there is so much reasonable doubt whether the course of wages in a single industry can be even approximately indicated, it would seem impracticable to obtain any notion of the general course of wages. Yet this problem is in reality simpler than the foregoing.

We must at the outset understand that in the actual condition of statistics any attempt to discover the course of average wages is out of the question. It is not a statistical impossibility had proper records been made in the past. In the absence of such records we have no means of ascertaining the average wages of all wage earners. How then shall we attempt to combine such partial information as we possess?

If we are to succeed in this effort we must borrow a device from the technique of price statistics,—the scheme of index numbers. This method of computation has established itself so firmly in price statistics that it is rarely questioned in that field. Its purpose and method is so thoroughly familiar that it needs little explanation. It aims to secure not the

variation of average prices, but the average variations of prices.¹ Its method is commonly described as reducing several series of actual prices to relative prices by taking a certain base line, a year or a period of years, for each series, making the base equal one hundred in each series and subsequent prices in each series proportions of one hundred, and then combining these relative price series into a single expression. It might be explained in another way. It might be said that at the basic period one hundred dollars or marks, or any other denomination of money, would buy a certain quantity of a certain class of goods. The quantity may not be determined, but in the other years we find the sum of money necessary to buy the same quantity of these goods. The same idea might be applied to each series. Our result for the well-known Economist Index Number might then be expressed in this form: What was at the basic period the equivalent of £2200 worth of certain goods, each being represented in the sum of £100 worth, could be purchased at a later period for say £1900.

This explains the simplest form of the price indices for a series of goods as exemplified in the Economist Index Number. The reduction of this sum to an average by dividing by the number of quotations has no other purpose than to make the final result easily comparable to a convenient base,—one hundred. More complex forms of index numbers seek to find a measure of the relative proportions of the different commodities in exchange, and thus approach the idea of the total prices paid for the articles included in the investigation.²

¹ Mr. A. L. Bowley, an unfriendly critic of the Aldrich Report in its treatment of wages, understands its method perfectly when he speaks of "Average Change" as "the quantity evaluated in the American report."—"Wages in the United States and Great Britain," *Economic Journal*, September, 1895.

² There is in this something of an approach to an average price, if understood in the following manner:—A dealer buys a series of commodities; A measured in gallons, B measured in barrels, and C measured in pounds. While an average price for the three commodities cannot be calculated, we can assume that xA , yB , zC each cost one hundred dollars, and that he buys xA , $2yB$, and $3zC$. Now if at a later period xA costs \$105, yB \$95, and zC \$90, and he continues to buy the same quantities, his total price becomes \$565 instead of \$600. The average price for what was formerly \$100 worth of goods has fallen to \$94.25.

It would appear that these complex forms had a justification which must theoretically be denied to the simple average. This theoretical superiority of the complex forms would be of practical importance if there were no such things as "general movements of prices." If each article followed its own law of variation then it would, indeed, be true that we must give greater weight in estimating changes in price levels to a rise in the price of wheat than a fall in the price of nutmegs. If each article in its price movements was a law unto itself, not only would this be necessary but our index numbers must be far more comprehensive than any which exist.

It has been frequently pointed out that the various index numbers show a remarkable agreement, and that different methods of calculation on the basis of the same figures bring results which are surprisingly close.¹ This should not be a matter of wonderment, for it is only a confirmation of what index numbers are designed to show, namely, that there are such things as general price movements.² If an absolutely uniform law governed prices the matter would be plain. If for a series of articles, *A*, *B*, *C*, and *D*, the prices in a given year were 75, as compared with 100 at a previous period, no importance which might be assigned to any one of them could make the relative price for the group any other than 75. Let us vary the proposition slightly and assume the following indices: *A*, 70; *B*, 74; *C*, 76; and *D*, 80. The simple average of these indices is 75. A system of weighting might indeed change it somewhat but could not lower it below 70 or raise it above 80. If the series showed no agreement, if *A* were 50, *B* 75, *C* 100, and *D* 150, one could not tell whether prices has risen or fallen without knowing the sig-

¹ Professor F. W. Taussig, "Results of Recent Investigations on Prices in the United States."—*Yale Review*, November, 1893, p. 238.

² Those who are sceptical with regard to index numbers always seem to me to forget more or less that there must be at any moment "a general level of prices." Professor A. Beauljon of Amsterdam, *Bulletin de l'Institut International de statistique*, 1887, vol. II, p. 106.

nificance to be attached to the articles. But if these are representative articles of commerce, and there be any general laws governing prices, the last contingency will not arise. The second is far more probable. In times of great economic revolutions it is possible for different classes of articles to vary in different ratios or different directions. In the period 1840-1860 the Aldrich Report showed a marked decline in prices of manufactured products combined with rising prices of food products. But such contrasts are rare; the general rule is variation in the same direction. Moreover, it is to be noted that the quotations of prices usually available for these comparisons are those of the more common commodities, which are subject to the general conditions of the market and reflect its changes.

The application of index-number methods to wages was to my knowledge first attempted in the Aldrich Report, though the suggestion occurs earlier.¹ The method has not yet obtained, perhaps, general recognition in this field, and it has seemed desirable to explain its purpose and operation in a field of statistics where it has obtained a firm footing. What then has been established? Simply this, that inasmuch as prices are subject to general laws the average of price variations is an indication of the course of prices. From the great mass of prices we select a few samples. We find how these sample prices have varied, and we thus find out how all prices vary.

If wages, like prices, are governed by general laws, why should not similar methods be applicable to them? If we can select from the great mass of wages paid a sufficient number of samples, their variation can be assumed to be the variation of wages in general. The question is only as to

¹ In a report to the International Statistical Institute, May 13, 1887, Mr. Robert Giffen, speaking of wages as connected with index numbers, urges that they be considered, adding, "I am disposed to recommend by preference a separate index number, as the price of labor is to be contrasted rather than compared with the prices of commodities." *Bulletin de l'Institut International de Statistique*, vol. II, 1887, p. 131.

the sufficient number of samples. In the broad field of general wages it is possible to secure such a sufficient number. In the narrower field of an individual industry it may not be possible. Moreover, it must be recognized that a single industry may have a law of variation distinct from the general tendencies. Its higher paid men may be crowded out into other employments, and its lower grades retained. Moreover, it should again be noted that the available wage records will apply in the main to those categories of workmen who represent the general tendencies of the labor market. For it is clear that, other things being equal, the more numerous the occupation is represented the greater is the probability of our finding records of it.

The variety of occupations pursued among the people is perhaps even greater than the variety of commodities. Hence, we find it in practice extremely difficult to collect for a given industry a sufficient number of occupations to secure results which will be altogether satisfactory. Our scattered results, representing an occupation here and another there, are rather to be taken as samples, not so much of a particular industry as of all industry.

In passing judgment upon the results of such calculations one must, moreover, bear in mind the professed relativity of the figures. It is a familiar observation that the numerical terms in which statistics are stated leads persons to regard them as measures of absolute accuracy. Every statistician is aware that his figures in the most favorable cases represent only a high degree of probability, though in most cases a higher degree of probability than can be secured by any other method of determination. Index numbers have been adopted in the historical statement of price changes, because they have proven an acceptable way of indicating these changes. The most fanatical believer in these indices would not contend that he had found in them an absolute rule of measurement. Nor could such a claim be made for the method in

its application to wages. Here again it indicates tendencies rather than measures them. For the utilization of the available data for historical investigations of wages no better method has yet been devised.

Critics of this method have insisted that a more adequate showing could be made upon the basis of average wages. This is not to be denied, but it is contended that no satisfactory account of average wages has been or can be made for past epochs. In all attempts which have been made to compass the end, the conjectural elements are far more numerous than in the index method which has been described. The choice seems to lie between accurate materials and summary indicative methods of combination, and wholly unimpeachable methods of combination based on inadequate and conjectural materials.

A COMPARATIVE STUDY OF THE STATISTICS OF
AGRICULTURE OF THE TENTH AND
ELEVENTH CENSUS.

BY N. I. STONE.

The object of this paper is to make a study of some figures of the Tenth and Eleventh Census relating to farms, and their classification as to size and mode of tenure. With this object in view, the following tables have been prepared by the writer on the basis of the figures given in the tables of the census.

Table I gives in the first two columns the per cent of increase of the number of farms during each of the two decades between 1870 and 1890. These figures have been taken from the volume on Agriculture of the Eleventh Census (pages 1 and 2). The other columns show the increase of total area in farms, as well as the increase in number of farms, in comparison with the figures of 1870, the latter being all reduced to one hundred.

Table II shows what per cent of the total number of farms was cultivated by owners, what by tenants for fixed money value, and what for share of products. This table has also been made up of figures which are found separately distributed through the various tables of the two census volumes.

Table III shows in greater detail what is indicated in Table II. It treats each of the three classes of farms mentioned under seven different groups, according to the size of farms, following the classification of the census. It will thus enable us to state with certainty in what particular group there is a tendency toward an increase or falling off of ownership, tenancy, or sharing of product. The table has been constructed by making the total number of farms in each group equal to one hundred and then calculating what per cent of these comes under the first, second, and third classes, respectively. As the census for 1880 does not give any figures for the five grand divisions (the North Atlantic, South Atlantic, North

Central, South Central, and Western), taken as a whole, it was thought best to take six typical Southern States and twelve of the Northwestern States, thus getting a view of the most important States in the Union in point of output of the staple products of the country,—wheat and cotton.

Although a comparison of the respective figures for 1890 and 1880 in Table III will show the changes that occurred in the last decade, still it may lead to erroneous conclusions unless great care be taken. To take, for instance, the State of South Carolina. The figure in the first group under Class I in 1880 is 16.80 per cent, that for 1890, 22.88 per cent. It would be wrong to draw from this the conclusion that the number of farms under ten acres cultivated by owners has increased somewhat over 6 per cent during the decade of 1880–1890. It may represent an actual increase and may not, and at any rate it does not tell us anything about the absolute increase. What the two tables do tell us is that for every hundred farms under ten acres in 1890 there were more farms cultivated by owners than in 1880. Each of the two tables represents, so to say, a static distribution of farms of a certain size under the various classes. To get at the dynamic conditions, Table IV has been prepared. This table shows us the actual increase per cent in each group since 1880.

Table V represents the distribution of farms according to size, both for the United States and the five grand divisions, as well as for the States given in the previous tables. This table merely tends to show what was the prevailing type of farm cultivation in each of the two decades, without reference to the mode of tenure. The latter point is brought out in Table VI, in which Part A takes up Class I,—farms cultivated by owners. Parts B and C refer to farms rented for fixed money value and share of products, respectively. By making the total in each class equal to one hundred, we find what portion of the total number of farms in that class comes under each of the seven groups. It is only on taking

Table VI in connection with Table III that we get a full idea of the static condition in each of the States or groups. Tables III and VI may be said to represent the same condition from two different points of view, but if we compare Table V with Table VI, we may say that while the former gives us a view of the conditions from the purely agricultural or technical point of view, the latter present the economic aspect of the subject.

Table VII is to Table V what Table VI is to Table III. It shows the absolute increase or diminution for each group in the United States and in each of the five grand divisions.

I.

The first conclusion that forces itself upon the mind on looking at Table I is the remarkable diminution in the rate of increase in the number of farms during the eighties as compared with the seventies. This is true for the United States as a whole, as well as for each of the five grand divisions except the Western. Indeed, the rate of increase in that division is even larger in the last decade than during the preceding one — 74.24 per cent as against 73.06 per cent. This is easily explained by the greater facilities which the Western States offer for new settlers as compared with those in other parts of the country. These include greater abundance of unoccupied land, its smaller cost, greater fertility, etc. The relative change in the rate of increase in the number of farms is more correctly represented in column C, which was obtained by representing the number of farms in 1870 by 100; this has the advantage of having the figures reduced to one basis. The difference between the conditions in the Western division and those in the other States is made here more apparent; thus, while the rate of increase for the United States has fallen from 50.71 per cent during the seventies to 20.89 per cent during the eighties, that for the Western division has increased from 73.06 per cent for the former decade to 128.97 per cent for the latter. The other

divisions do not differ much from the United States as a whole, except the North Atlantic, where instead of a diminished rate of increase we see an actual falling off in the number of farms from 1880 to 1890.

The full significance of this table, however, does not reveal itself until we have taken into account the increase of area in farms. Here we may repeat what has been said in regard to the increase of the number of farms. Everywhere, except in the Western division, we see a diminution in the rate of increase. What is more important, however, is that while during the decade of 1870-80 the number of farms had grown faster than the area, the reverse is true of the succeeding decade, *viz*: the growth of the number of farms has not kept pace with the increase of land in farms. This may be seen at a glance on comparing columns A and B or C and F, as well as from the figures representing the average size of farms in the United States, which were 134 acres in 1880 and 137 in 1890; the single exception is in the case of the Southern States (South Central and South Atlantic divisions), which is due no doubt to the crumbling up of the old plantations into small farms, a supposition borne out not only by statements of authoritative writers¹ on the subject, but also by the examination of the other tables which we shall presently make.

There can therefore be no doubt as to the process of concentration which is going on in the agricultural industry of all the other States. The question that now remains is at whose expense does the concentration go on? Two explanations might be advanced: either the medium size, self-supporting farms are swallowed up by the so called "bonanza" farms; or the small farms, generally insufficient to support their owners, are giving way to the medium size farm. Let us look at Table V to see which of the two explanations is more in accordance with actual facts.

¹ See, for instance, General Walker's article on "American Agriculture" in the *Princeton Review*, reprinted in the Tenth Census, volume on Agriculture, p. xxviii. Also E. Levasseur, *L'Agriculture aux Etats Unis*, p. 203 and 204.

Looking at the figures for the United States we see that the number of farms in the group 100–500 acres has increased most, making up 44 per cent of all farms in 1890, while constituting 42.3 per cent in 1880. The only other group which shows an increase is that of 20–50 acres, but the increase is very slight,—from 19.49 per cent in 1880 to 19.77 per cent in 1890,—and is no doubt due to the process of disintegration undergone by the large estates in the South, mentioned above. That such is, indeed, the case may be seen from a glance at the figures under this group for the various geographical divisions; we then see that in all parts of the United States this group has come to represent a smaller fraction of the total number of farms except in the Southern States, where it has risen from 21.86 per cent to 25.27 per cent in the South Atlantic division, and from 23.64 per cent to 26.03 per cent in the South Central division.

Coming back to the figures for the United States we see that all the other groups, small farms and large ones alike, are beginning to constitute a smaller fraction of the total. Following this out for the separate geographical divisions, we can sum up the results under three heads: (1) The South Atlantic and South Central divisions show an increase in the smaller groups and a falling off in those comprising farms over 100 acres; (2) The North Central and Western divisions are marked by just an opposite tendency,—a slight though marked falling off in the lower groups, and a similar slight increase in the groups over 100 acres, with group of 100–500 acres having the largest increase; (3) The North Atlantic division, where we see a falling off through all the groups except those comprising farms between 50 and 500 acres.

But instructive as these figures are they still leave room for doubt as to the cause and real significance of these changes, for the figures of 1880 and 1890 do not indicate any actual change within each group, but merely a shifting from one group to another. To illustrate by an example: The figures for 1880 and 1890 in Table V for the South Atlantic

division show that the lower groups constituted a larger percentage of the total number of farms in that region in 1890 than they did in 1880, and also that the reverse was true of the higher groups. But whether that was due to an actual falling off in the number of farms in the higher groups and their sub-division into smaller farms, or to the fact that the former increased but not so fast as the lower, cannot be seen from the table. Table VII has been constructed to obviate that difficulty.

Each figure in that table represents the per cent increase of the given group as compared with the corresponding figure in 1880. We are thus enabled to see not only the actual change taking place in each group in the various regions, but also in what relation they stand to each other and to the region as a whole. Taking up the table in the same order as we did with Table V we find the same results brought out in a more graphic manner. Group 100-500 for United States has increased over 18 per cent during the decade, making it 5 per cent over the average increase of all farms, 8 per cent over that of the highest group, and nearly 12 per cent over that of the lowest. All groups, however, show some increase. Taking up the divisions under the three heads indicated above we come to the following conclusions: —

1. The diminishing portion which the higher groups make up in the South can now be traced to two causes: (a) In the South Atlantic States there is an absolute falling off of 13.19 per cent in group 500-1000, and of 17.37 per cent in that over 1000 acres; (b) the smaller groups have increased absolutely and quite considerably, group 20-50 being far in advance of the rest, namely, 34 per cent, which is more than twice the average rate of increase for that region. The same is true, on the whole, of the South Central division, except that there we see some increase in the higher groups as well, though far below that in the smaller groups. This difference may be explained by the fact that the South Cen-

tral division includes States like Tennessee, Kentucky, and Arkansas, which by their geographical positions are a sort of a transition from Southern to Northern conditions, and make it possible for large farms to grow. Not only is this true of the character of the soil, but of the land-owning people as well; besides, the State of Texas alone, also included in the South Central division, goes far in swelling up the figure for the two higher groups. Indeed, it is the *only* State in that geographical division which shows an increase for the two groups, *viz*: from 5988 farms in 1880 to 8717 in 1890 in the group of 500–1000 acres, and from 8798 to 5415 farms in that of 1000 acres and over; all other States in that division having suffered an absolute falling off in the number of farms in the two groups.¹ The remarkably uniform predominance in the growth of the 20–50 group in all the Southern States must be explained by the fact that this represents the most normal holding for an average negro family in the South, just as the 100–500 group represents a normal holding in the North. It is this group that most probably comes in place of the larger estates and serves as a transitional stage of renting for share of product to complete ownership. We shall return to this question again when analyzing Table III. We may state, however, now that the large estates are disappearing, or at any rate are rapidly decreasing in the South Atlantic States, as well as in the South Central, with the single exception of the State of Texas, that the 100–500 type seems to meet with greater favor in the South Central States than along the Atlantic, and that, though it now constitutes the largest group, containing somewhat more than one-third of all the farms, it is going to give way to the 20–50 group, if the latter keep up its present rate of increase.

2. The North Central and Western divisions.—The two divisions differ quite in their appearance as reflected in Table VII. In the North Central we find the lowest group

¹ Cf. Table 3, Agriculture, p. 117, Eleventh Census.

increased by over 7 per cent, with the group next to it suffering an absolute falling off of nearly 8 per cent, and the group next to the latter barely holding its own. From group 100-500 up all show great increase, the larger holdings showing also a greater increase. Taking now the Western division we find a great increase in all the groups, ranging from 45.49 per cent to 85.4 per cent, the greatest increase falling again to the lot of the higher groups. The enormous difference between the two geographical divisions in the case of the smaller groups is easily accounted for, (a) by the greater cheapness of land in the West as compared with that in the North Central States,—a point of utmost importance to people of small means, for, as we shall see further from Table III, these farms are cultivated mostly by owners; (b) by the greater use they can be put to in the West by way of orchards, orange groves, etc. The greater rate of increase in the higher groups is probably due to the greater abundance of fertile, unexhausted soil,—a condition of primary importance in the case of “bonanza” farms, which as a rule devote themselves to extensive cultivation of one kind of grain, preferably wheat; and also to the cheapness of land, a factor which makes itself as strongly felt in case of very large farms as in that of very small ones. Allowing for the differences between the two divisions, as just stated, we still can point to the similar tendencies they both reveal, which are perfectly natural, since they are both largely cereal-producing regions. Thus we find the growth of the higher groups partly in excess and partly at the expense of the lower groups. With regard to the very large farms, as comprised under the two highest groups, so much can be said in answer to the question lately vexing the public mind, as to whether the “bonanza” farm tends to swallow up the smaller farms. As far as the figures of the census indicate, the “bonanza” farm shows a tendency to increase both absolutely and relatively, and in the Western division more so than in the North Central. Indeed, in the latter it con-

stituted but an insignificant though increased fraction, having risen from 1.1 per cent of all farms in 1880 (adding the two last columns for that division in Table V) to 1.45 per cent in 1890. In the Western division the figure is rather significant, namely, 10.18 per cent for 1880 and 10.48 per cent in 1890. But both Tables V and VII conclusively show that the growth is at the expense of the very small holdings, rather than of the normal ones, which are not only holding their own but increase at a rate far above the average for the respective regions. At present that group (100-500) constitutes more than one-half of the farms in the North Central and a little over 60 per cent in the Western division.

Taking some of the separate States in the two divisions the truth of what has been said will become still more apparent. Thus in Minnesota the two higher groups combined barely exceed $1\frac{1}{2}$ per cent, in Kansas 8 per cent, in Nebraska $2\frac{1}{2}$ per cent. But the further West we go the greater does the proportion become, rising from 6.64 per cent in Washington to over 15 per cent in California, known for its enormous wheat farms. The same is true of the very small farms, which are less than 1 per cent in each of the first three States mentioned, and constitute more than 5 per cent in California for the lowest group alone, or 18 per cent for farms below 20 acres.

The increase in the number of farms alone, however, is not a sufficient test in determining the importance of a particular group in the agricultural industry. The acreage which it covers is just as important and in some respects far more so than the mere number of farms. Ten farms in the highest group may contain more land than a thousand in a lower one. In discussing the question of the concentration of land, the latter test is of greater importance than that offered by the number of farms. It is therefore to be greatly regretted that the census tables make it impossible to apply that test, since they do not give the acreage for each group of farms.

II.

So far we have considered the subject merely from the standpoint of size of farms. In the tables reviewed the purely agricultural aspect was more reflected than the economic. The latter is brought out more clearly in the tables which we will now consider.

Table II has been taken from the census. A cursory view will show that in 1890 there was a smaller number (proportionately) of farms cultivated by their owners than in 1880, and this all over the United States except the Western division. The South Central and South Atlantic divisions stand at the bottom of the scale, which may probably serve as a partial explanation for the absence of heavy mortgage indebtedness there. The proportion of farms rented for money as well as those rented for share of products has increased again with the exception of the Western division, and again the Southern States come in for the highest share proportionately of farms rented for share of products.

When analyzing Table I we attributed the rapid growth of the number of farms in the South, as compared with that of the area in farms, to the crumbling up of the old plantations. An examination of the other tables is necessary to prove that supposition. Two other explanations might be advanced: (1) that new hitherto unused land is being taken up for cultivation, but in such small lots as to make the increase in number of farms greater than the increase in area; or (2) that the large plantations are not decreasing in size, but are merely rented out in smaller lots to individual farmers. The former explanation will be found to have no validity when we look at Column D, Table I, which shows that in the South Atlantic division the area under cultivation has actually diminished since 1880. As to the South Central division, where an increase of land is shown, this is not sufficiently large alone to account for the change, though it may do so in part. Two suppositions remain then to be tested, the one originally suggested, namely, the growth of small owners or

the growth of tenants for share of product. If the latter be true, we should see a diminution of large farms both owned and rented, and a growth of small farms rented. If the former, the same diminution of large farms with a corresponding increase of small farms cultivated by owners.

Table VI, already referred to, points to the decrease of large farms and the increase of small ones; it is thus favorable to either supposition, but is not sufficient to apply the latter half of the test. An examination of Table III shows that in the States of Texas and South Carolina there were less farms, proportionately, cultivated by their owners in 1880 than in 1890 in the two lower groups. Parallel with that we see a smaller proportion of farms rented for share of product in 1890 as against 1880 for the same groups, while the number of farms rented for money has changed but little.

Taking up the three higher groups in the same two States we notice a falling off in the proportion of farms cultivated by their owners, and an increase in those rented for share of products. The latter fact may seem to indicate that the large plantations which cease to be cultivated by their owners are rented out bodily by large tenants; but this is hardly the case, and is not borne out by statements in the literature on the subject. It is more likely due to the imperfections of the census, or census enumerators, who have often entered a plantation let out in several parts, sometimes as a unit and sometimes in its several parts as they were rented.¹ In the States of Georgia, Mississippi, and Louisiana we notice a remarkable phenomenon. All the groups (except two in Georgia) have lost in proportion of owners since 1880, and the increase has gone largely to Class II, *i. e.*, farms rented for money. But what at first sight might seem a case of universal divorce of the land-owning and land-tilling classes from their land turns out to be a somewhat more complex phenomenon when we consult Table IV. We there see that

¹ Cf. Eleventh Census, Agriculture, p. 2; paragraph 1.

under Class I only the two higher groups have suffered an absolute diminution, except in the State of Texas, as pointed out before, while in the lower groups there has been, on the whole, an absolute increase.¹

But to return to our test. If we draw vertical lines after the third column in Table III (in the group of Southern States) in each of the three classes, we are struck by the remarkable contrast between the left and right parts on either side of these lines. In Class I we notice the comparatively low figures on the left and high figures on the right; in Classes II and III the reverse is true. If we follow the figures from left to right in Class I we notice an almost unbroken chain of a gradually ascending series of figures, indicating that the smaller farms included under the first three groups are as yet largely rented, and that only about one third is in the hands of owners; but on the other hand we see the three higher groups losing (relatively) in ownership in all the six States, so that no room is left for doubt on that point; still it might be urged that this diminution merely points to the fact that the large plantations are being cultivated less and less by their owners, but not that they slip out entirely of the hands of the latter. Tables VI and IV show the fallacy of such a supposition.

From Table VI we see that the two higher groups in the South Atlantic division, which in 1880 constituted 7.5 per cent of all farms cultivated by their owners, in 1890 amounted to only 5.45 per cent; in the South Central division in 1880 they equalled 6 per cent; in 1890, 5.07 per cent. Table IV shows that this falling off was not merely relative but absolute, since in all the Southern States, with the exception of Texas, brought out in the table, the two higher groups in Class I have diminished by from 5 to 26 per cent, and not a

¹ The average figures for the South Atlantic and South Central divisions for 1880 could not be worked out owing to a lack of classification of the States in the Tenth Census, which would involve almost endless work in getting the few figures. But the six States are typical of the South Atlantic and Gulf States sufficiently to indicate the general tendency in each of the divisions.

single one held its own. Coupled with the simultaneous increase of farms owned in the lower groups, as indicated in Table IV, and an actual falling off in land under farms in the South Atlantic division, as pointed out in analysis of Table I, it can mean only one thing—the conversion of the big plantations into small farms owned by the tillers. The increase of large plantations, rented for share of product, as indicated in the last two columns of Class III of Table IV, means, in the light of this, that before becoming the property of a small farmer they go through a transitional stage of being let out. It is certainly one of the greatest defects of the Eleventh Census that large plantations rented out to several individual tenants should have been entered under the two higher groups instead of under groups corresponding to the size of the lot rented by each farmer. It tends to vitiate all calculations and leads to erroneous conclusions. But for that the figures might have thrown more light on the subject and created less confusion.

Table VI illustrates the shifting from group to group at the time of the taking of the last two census enumerations. Thus we see from Table VI that in 1880 of all farms cultivated by their owners those in the group 100–500 constituted the prevalent type, being in fact a little over one-half of all farms owned. In 1890, however, the group amounted to but 46.04 per cent in South Atlantic, and 51.76 per cent in the South Central division, the latter figure bearing out again the contention set forth above, namely, that the South Central States are more favorable to large holdings, the conditions there being more near those prevailing in the West, generally, than in the States along the Atlantic border. The group which is forcing its way to the front in that class of farms is the one next below it, 50–100 acres. The two groups together are the prevailing types, and probably indicate the condition of farm ownership to which the South is tending through disintegration of the large plantations on one hand

and the increase and gradual transition of the lower groups into the higher on the other.

Part B of Table VI shows that among tenants "for fixed money payments" the group of 20-50 acres constitutes the largest share, the higher groups constituting but a very small fraction.

Part C reveals the same state of affairs, and shows how small the fraction of large farms rented is, even if we did not take into account the inaccurate tabulation of the census enumerators.

A few remarks in regard to the mode of tenure in the cereal-growing States. It is a well-known fact that the bulk of the total mortgage indebtedness in the United States falls on the Northern and Western States; hence we should expect there a greater proportion of all farms to be cultivated by their owners, since the mortgage enables the tiller of the soil to hold on to his old farm or to buy a new one, where he otherwise would have to rent. This is shown by the figures for the twelve typical Central and Western States given in Tables III and IV. Table III show that both in 1880 and 1890 the proportion of those cultivating their own farms to the total was quite high in all groups,—as a rule over 60 per cent, and in many cases near or over 90 per cent.

If we compare the figures for 1890 and 1880 in Table III and draw a vertical line, as was done in the case of the Southern States, we will notice that in most of the groups to the left of the line, *i. e.*, in the three lower groups, the proportion of farms cultivated by their owners has increased, while to the right has mostly decreased; in the latter there are many exceptions, but it is true without exception of the highest group. This of course does not mean that the "bonanza" farm is disappearing, for, as has been shown elsewhere in this paper, they have increased absolutely and at a far higher rate than any other group, but, since their number is comparatively small, they constitute a smaller portion of the whole. Besides, if the figures representing the increase in the acreage

in each group were accessible the "bonanza" farms would undoubtedly make a still better showing. The other more important fact is that the higher groups show a relative increase in Class III. Whether that means that the owners of the "bonanza" farms are beginning to prefer letting their lands to smaller tenants, as is the case in the South, or that owners of land in the lower groups next to the one in question are beginning to rent more land in addition as a sort of transition to the higher group, cannot be said with the poor tabulation of the census.

Table IV, which indicates the absolute growth of each group per cent since 1880, shows that the increase in farms cultivated by owners in the three lower groups is not only relative, but, with a few exceptions, also absolute. The increase is especially large in the three Western States, California, Washington, and Oregon, and this is an additional proof of what has been said before concerning the favorable conditions in the West for the increase of both very small and very large farms.

The most interesting fact, however, revealed in Table IV is that in Class III of farms, *i. e.*, those "rented for share of product," the lower groups show an actual falling off, which, coupled with the increase in Class I, indicates that the tenant of 1880 has become in many cases the property owner in 1890. The higher the group in Class III the greater is the increase. The only explanation we can give for it is that these high figures in 1890 were the foreboding of the subsequent disintegration of the "bonanza" farms, which has been taking place to a considerable extent during the present decade, and which will probably reveal itself in the figures of the Twelfth Census. It is thus very likely that they indicate the same transitional stage from the "bonanza" type to the normal¹ one, as they have in the South, though under

¹ By the normal type is meant here a farm of about 160 acres, which is considered by agriculturalists as sufficient to maintain an average family and keep it employed, with an occasional hiring of one or two men in the harvest season.

different circumstances. If this supposition be true, we should see in the Twelfth Census an increase in the smaller and middle groups in Class I. In connection with this another serious defect in the tabulation of the census must be pointed out. The census bureau was very careful in grading the lower groups, but has unnecessarily included under one head farms as wide apart as those of 100 and 500 acres.

Taking into consideration the definition of a normal farm, given in the footnote, we should say that the more proper classification ought to include farms from 100-200 acres under one head and leave those between 200 and 500 under another. We would then be able to know more accurately which of the two types was the more prevalent one. The defect is especially to be regretted when we recollect, from what has been said of Table V, that this group constituted more than half of all farms in the North Central and Western divisions, and has been increasing since, according to observations of writers on the subject. Besides it just serves as a sort of land-mark between the smaller type, which is not sufficiently large to give enough employment to its owner, and the larger type which represents a purely capitalistic undertaking requiring considerable outlay of capital and employment of a good deal of labor.

So much for these tables. Table V shows us, as in the case of the Southern States, the distribution among the groups in the three classes. From Part A we see that of all the farms cultivated by their owners those in the normal group (100-500) constitute more than one-half. In the separate States the proportion is still higher, rising to over 90 per cent in the Dakotas, though falling to 88.81 per cent in Ohio.

Part B shows that of all farms rented for fixed money value the greater part also falls within the group mentioned. The same can be said of Part C.

As to the North Atlantic Division, we have seen in Table I that there was an absolute falling off in the number of farms here, and a still greater falling off of land in farms. Table

VII shows in detail how this regressive process has affected each of the groups; it appears that the fourth and fifth groups, *i. e.*, farms between 50 and 500 acres, have suffered the least, while the two higher groups have diminished by more than one-fifth and slightly less than one-fourth, respectively.

Table V shows what shifting occurred in the position of these groups according to their numerical strength. The fourth and fifth groups are now in front, still more so than they were in 1880, and the two highest groups have dwindled down to a very insignificant figure. Hence we may say that the medium size farm has grown at the expense of the small and large farms.

III.

Summing up we may say that in all parts of the country the same tendency reveals itself,—the growth of the medium size farm at the expense of the other two extremes. In the South there is besides a tendency for the 20–50 acre group to expand, which is undoubtedly due to the fact that it is about as sufficient to maintain a working family cultivating cotton as the 160 acre farm is in the North, where cereals are raised. In the West, though we have seen the “bonanza” farms have increased to one-tenth of the total and to about 15 per cent in California, it must be remembered that a very great part of these were rented and not cultivated by their owners, which is probably a sign of disintegration rather than growth; this, however, cannot be definitely settled before we see the figures of the Twelfth Census. The downfall of the large farms in the North Atlantic group has been sufficiently dwelt upon.

In conclusion one more criticism must be made with reference to the census in addition to those made elsewhere in this paper. This is, namely, in regard to the lack of any classification of figures under the heads of live-stock, implements and machinery, value of farm products, cost of fertilizers, improved and unimproved land, etc. Had these data been classified according to size of farms it would have

been a mere matter of close study of figures to determine the causes of the growth of one or another type of farm in the various divisions of the country. Furthermore, no exhaustive study of the economics of American agriculture is possible, in the opinion of the writer, if we cannot tell what portion of the total capital invested in the farm of a given type (size) goes toward paying for land, how much to machinery, how much to cattle, how much to wages for labor, etc. Only a study of this kind would enable us to tell which of the several types is a more economical and therefore progressive and desirable form in the agricultural industry, and which is most likely to ultimately survive. But with all these figures thrown together into one lump sum for each separate county, it is impossible to undertake any such study.¹ In the interest of science, in the interest of American agriculture, it is hoped that the next census of the United States will improve upon its predecessor along the lines indicated above.

¹ For a more complete criticism of the agricultural statistics in the census the reader is referred to an article by the present writer in the collection of essays, published by the American Economic Association, under the title: "The Federal Census." *Critical Essays by Members of the A. E. A.*, March, 1899.

TABLE I.

	A. Increase in Number of Farms		B. Number of Farms in			C. Increase in Number of Farms Expressed on the Basis of Col- umn B.	
	1870-80.	1880-90.	1870.	1880.	1890.	1870-80.	1880-90.
United States.....	50.71	13.86	100	150.71	171.60	50.71	20.89
South Central Division...	73.51	22.57	100	173.51	212.68	73.51	39.17
South Atlantic Division...	72.26	16.32	100	172.26	200.37	72.26	28.11
Western Division.....	73.60	74.24	100	173.6	302.07	73.60	128.97
North Atlantic Division...	15.72	-5.40	100	115.72	109.47	15.72	-6.25
North Central Division...	50.92	13.30	100	150.92	171.00	50.92	20.08

	D. Increase of Total Area in Farms		E. Total Area in Farms in			F. Increase in Total Area in Farms Based on Column E.	
	1870-80.	1880-90.	1870.	1880.	1890.	1870-80.	1880-90.
United States.....	31.48	16.25	100	131.48	152.85	31.48	21.37
South Central Division...	34.58	17.14	100	134.58	168.55	34.58	33.97
South Atlantic Division...	12.42	-1.24	100	112.42	111.02	12.42	-1.40
Western Division.....	61.52	80.50	100	161.52	291.52	61.52	130.00
North Atlantic Division...	8.35	-7.72	100	108.35	100.00	8.35	-8.35
North Central Division...	48.60	23.96	100	148.61	184.31	48.61	35.70

TABLE II.

	Per Cent of Farms Cultivated by Owners in		Per Cent of Farms Rented for Fixed Money Value in		Per Cent of Farms Rented for Share of Products in	
	1880.	1890.	1880.	1890.	1880.	1890.
United States.....	74.44	71.63	8.04	9.96	17.52	18.41
South Central Division.....	63.79	61.55	11.85	13.98	24.36	24.47
South Atlantic Division.....	63.88	61.51	11.63	12.82	24.49	25.67
Western Division.....	86.01	87.91	5.45	5.00	8.54	7.09
North Atlantic Division.....	84.01	81.60	7.04	7.91	8.95	10.49
North Central Division.....	79.52	76.62	5.23	7.66	15.25	15.72

PER CENSUS. TOTAL IN EACH GROUP = 100.

C. CLASS III.—PER CENT OF FARMS IN EACH GROUP RENTED FOR SHARE OF PRODUCTS.							
p	Group 1.	Group 2.	Group 3.	Group 4.	Group 5.	Group 6.	Group 7.
	Under 10 Acres.	10 and Under 20 Acres.	20 and Under 50 Acres.	50 and Under 100 Acres.	100 and Under 500 Acres.	500 and Under 1,000 Acres.	1,000 Acres and Over.
	16.52	29.06	44.56	23.73	12.41	6.00	1.21
	20.79	38.45	47.63	22.02	9.25	5.13	1.84
	35.88	64.72	60.47	32.02	15.62	6.70	3.77
	39.39	65.66	59.39	38.47	12.03	4.92	2.78
	28.48	47.93	39.58	18.70	7.60	5.06	3.74
	44.32	62.44	51.20	23.33	7.00	4.37	3.21
	41.41	63.59	50.73	18.36	7.44	5.71	4.84
	42.31	59.45	49.18	17.74	6.15	3.94	2.07
	31.71	53.94	44.19	14.00	6.07	5.09	4.70
	30.18	43.75	37.04	12.79	5.99	4.45	4.02
	34.26	60.99	62.48	31.11	12.60	7.54	6.60
	43.26	68.79	63.39	22.55	7.77	5.21	3.19
	5.96	8.64	12.20	16.34	18.73	10.77	5.52
	6.48	11.06	12.69	14.12	14.06	7.49	6.35
	11.64	18.79	19.76	20.54	20.18	13.69	16.60
	16.88	28.13	24.06	19.76	15.49	7.12	13.08
	12.17	20.65	24.14	23.28	21.00	12.19	8.36
	18.41	32.43	32.85	26.40	17.48	7.63	7.24
	6.84	11.58	18.18	17.03	15.17	13.30	9.58
	10.71	18.36	25.52	23.02	16.00	8.10	7.70
	5.79	6.53	5.75	8.73	10.95	4.56	13.12
	9.22	11.87	7.48	8.16	7.57	9.31	7.59
	10.19	19.65	29.72	25.41	21.07	15.06	14.40
	15.39	28.17	28.20	15.84	10.47	9.58	8.93
	6.86	16.70	24.88	21.88	15.60	13.22	9.03
	13.75	31.21	31.87	19.36	11.69	9.01	2.54
	....	18.18	8.55	3.34	4.66	9.93	8.74
	2.38	9.52	15.24	11.15	3.00	5.69	5.41
	12.82	12.90	14.90	12.77	10.34	12.46	15.51
	2.41	5.16	7.24	8.30	8.93	19.38	17.04
	6.63	8.11	11.31	11.01	10.39	14.96	12.76
	3.42	6.00	3.80	4.20	5.53	7.19	9.74
	2.30	11.27	5.80	5.14	3.74	3.17	8.06
	3.13	5.62	6.03	7.45	8.56	11.39	7.29
	5.41	6.28	12.66	10.80	9.24	10.31	5.97

* No estimate is made for the Dakotas owing to their different classifications in 1880 and 1890.

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TABLE V.—PER CENT OF FARMS IN EACH GROUP.
Based on Table III, pp. 116-117, Agriculture, Eleventh Census.

	Year.	Total Farms.	Per Cent of Farms Under 10 Acres.	Per Cent of Farms of 10 and Under 20 Acres.	Per Cent of Farms of 20 and Under 50 Acres.	Per Cent of Farms of 50 and Under 100 Acres.	Per Cent of Farms of 100 and Under 500 Acres.	Per Cent of Farms of 500 and Under 1,000 Acres.	Per Cent of Farms of 1,000 Acres and Over.
United States..	1890	100	3.29	5.51	19.77	24.57	44.00	1.85	0.69
	1880	100	3.47	6.35	19.49	25.76	42.30	1.87	0.71
North Atlantic Division.....	1890	100	5.83	7.45	17.79	29.63	38.61	1.49	0.11
	1880	100	6.06	7.68	18.07	29.19	38.29	0.59	0.14
South Atlantic Division.....	1890	100	5.18	8.50	25.27	20.26	36.81	2.89	1.07
	1880	100	5.05	8.37	21.86	19.33	39.97	3.88	1.50
North Central Division.....	1890	100	1.88	2.70	15.36	27.39	51.17	1.22	0.23
	1880	100	1.98	3.15	17.40	29.98	46.38	0.92	0.18
South Central Division.....	1890	100	2.87	8.63	26.03	21.39	37.48	2.45	1.13
	1880	100	3.06	10.19	23.64	20.94	37.94	2.02	1.31
Western Division ..	1890	100	3.73	4.78	10.75	10.14	60.09	6.35	4.13
	1880	100	4.39	5.16	11.51	12.15	56.46	6.33	3.85
South Carolina	1890	100	7.44	12.96	34.65	15.60	25.51	2.68	1.15
	1880	100	7.62	13.33	29.31	14.50	29.44	3.73	1.74
Georgia	1890	100	2.59	6.34	32.32	18.89	34.69	3.54	1.61
	1880	100	2.31	6.27	26.35	18.79	38.69	5.05	2.53
Alabama.....	1890	100	3.25	7.61	32.86	19.28	33.43	2.57	1.00
	1880	100	2.85	9.61	30.71	19.47	32.57	3.42	1.37
Mississippi.....	1890	100	2.03	12.52	33.51	17.41	30.25	2.46	1.15
	1880	100	2.38	11.74	26.37	18.98	34.75	3.67	1.80
Louisiana.....	1890	100	3.17	14.82	31.96	16.28	20.02	2.92	1.84
	1880	100	4.03	14.09	26.15	17.60	31.12	4.47	2.73
Texas.....	1890	100	1.53	6.33	27.31	20.45	38.19	3.82	2.37
	1880	100	2.06	9.63	26.07	16.98	40.66	3.44	2.18
Ohio.....	1890	100	4.90	5.83	20.62	32.77	35.41	0.41	0.06
	1880	100	4.51	5.73	20.01	31.64	37.48	0.53	0.10
Indiana.....	1890	100	2.90	4.03	22.11	32.90	37.24	0.70	0.12
	1880	100	2.51	4.13	22.37	33.00	37.16	0.68	0.15
Illinois.....	1890	100	1.75	2.91	15.89	28.56	49.72	1.01	0.16
	1880	100	1.69	3.24	18.22	29.75	45.58	1.27	0.25
Iowa.....	1890	100	1.14	1.58	9.12	26.42	59.97	1.56	0.21
	1880	100	1.18	1.80	12.67	31.57	51.34	1.24	0.20
Minnesota.....	1890	100	0.69	1.04	8.34	22.39	65.96	1.36	0.24
	1880	100	0.69	1.09	8.66	27.63	61.02	0.80	0.15
Kansas.....	1890	100	0.78	0.95	5.56	20.88	68.95	2.30	0.63
	1880	100	0.76	1.19	6.87	22.42	67.99	0.84	0.16
Nebraska.....	1890	100	0.40	0.45	2.70	17.53	75.70	2.04	0.47
	1880	100	0.63	1.10	5.20	26.27	65.63	1.05	0.17
North Dakota..	1890	100	0.05	0.04	0.42	1.80	90.88	5.00	1.41
	1880	100	0.24	0.36	1.20	3.13	93.22	1.41	0.42
South Dakota..	1890	100	0.06	0.12	1.11	3.53	91.78	2.99	0.37
	1880	100	5.34	7.56	14.54	10.96	46.37	8.25	6.94
California.....	1890	100	3.35	3.97	9.67	11.04	56.25	8.64	7.04
	1880	100	0.65	1.11	5.09	9.49	77.02	4.93	1.71
Washington....	1890	100	1.33	1.08	3.17	9.35	80.24	3.85	0.94
	1880	100	1.50	2.02	6.37	10.30	70.09	7.08	2.63
Oregon.....	1890	100	1.14	1.27	4.18	10.62	72.70	7.89	2.17

TABLE VII.—PER CENT INCREASE OF EACH GROUP SINCE 1880.
Based on Table III, p. 116, of Eleventh Census, vol. on Agriculture.

	Average Increase.	Per Cent Increase in Number of Farms —						
		Under 10 Acres.	10 and Under 20 Acres.	20 and Under 50 Acres.	50 and Under 100 Acres.	100 and Under 500 Acres.	500 and Under 1,000 Acres.	1,000 Acres and Over.
United States.....	13.86	7.15	4.21	16.02	8.59	18.44	11.09	10.38
North Atlantic Division.....	-5.4	-9.99	-6.74	-6.85	-8.84	-4.76	-20.95	-23.96
South Atlantic Division.....	16.32	19.18	18.06	34.42	21.92	7.12	-13.19	-17.37
North Central Division.....	13.30	7.74	-2.93	0.67	3.49	24.89	50.16	49.43
South Central Division.....	22.57	15.58	3.87	34.96	26.11	20.92	8.06	5.45
Western Division...	74.24	47.97	63.96	61.16	45.49	85.46	73.03	85.40

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A NOTE OF CORRECTION.

Some time ago I had the honor of presenting a paper on "Vital Statistics for the Twelfth United States Census" in the *Publications* of this Association. Some comments were also presented in connection therewith which I did not see in advance of publication, and to which I did not consider it necessary to make a detailed reply at a later period. Some misconceptions or misapprehensions of my purpose which appeared in these criticisms would be readily removed, as it seems to me, by reading the paper itself.

It has very recently come to my knowledge that such was not the case, at least in all instances, and that a portion of the review of Prof. Walter F. Willcox, in which he combats the idea of National interference with State affairs, such as might occur if the United States Government should undertake to forcibly regulate State or municipal registration of deaths, was afterwards used, without his knowledge at the time, during the last session of Congress to discredit the plan of collecting some representative mortality statistics of a reliable character from the "non-registration States." This criticism was founded on a misunderstanding of my position. I have not supported such interference or "compulsory coöperation" at any time, and should certainly, as a State registration worker, be one of the last to advocate such a course. I am sure that not one out of the many State registration services which have indorsed the plan of collecting *some* reliable mortality data by means of the census in representative districts of "non-registration States," would have done so if the plan had involved any unwarranted interference with State matters. I have consistently advocated voluntary coöperation of the Federal and State services for this purpose — the example of the State Weather Services in coöperation with the United States Weather Bureau in the Department of Agriculture shows how far such coöperation may go under intelligent direction — but I should earnestly deprecate governmental meddling or attempted dictation in matters

which the National Government has no right to control. This is quite unnecessary, however, in order to secure more reliable mortality statistics.

CRESSY L. WILBUR.

Lansing, Mich., June 7, 1899.

I regret that I misunderstood the contention of Dr. Wilbur and so attributed to him a position which he does not hold. A reader interested in the question whether my interpretation of his language was forced may satisfy himself on that point by reading the original article and my criticism of it in the issue of this journal for March, 1897. Certainly I had no intention or desire to misunderstand.

WALTER F. WILLCOX.

*Census Office,
Washington, D. C.*

AMERICAN STATISTICAL ASSOCIATION.

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SEPTEMBER, 1899.

NOTES ON MAP MAKING AND GRAPHIC REPRESENTATION.

BY W. Z. RIPLEY.

The necessity of a cheap and ready process of systematic map making for purposes of photo-engraving reproduction having been emphasized by recent experience in the preparation of a volume upon the *Races of Europe*, an attempt has been made to invent a number of labor-saving devices by which the old and slow methods of hand work might be obviated. The practicability of these has been demonstrated not only for experts but for educational purposes in the hands of students as well. Practice in graphic representation after methods which are so simple in principle as not to entirely absorb the attention of the student in mere technique, has been found to awaken interest, to vivify dry statistical details, and to stimulate analytical thought; while at the same time developing deftness of hand and accuracy of treatment. No excuse need be offered for a statement of the most simple details in these methods, since experience has shown that the simplest details are oftentimes the most difficult to evolve and to apply.

Before proceeding to the description of various technical processes it will repay us for a moment to consider a few

questions of general principle applicable to all methods of graphic representation. The first of these is the difficulty and danger incident to the use of color schemes. It is a cardinal principle in graphic representation that the visual impression should correspond directly to the facts as related to one another. Any scheme of color, therefore, which is not entirely logical, in a visual sense, is worse than misleading when applied to phenomena which are to be represented in a graduated series. A map in which green, red, yellow, and blue are indiscriminately used to represent different grades of intensity of suicide, for example, is fully as difficult to interpret as the statistical tables which it is intended to elucidate. The only opportunity for representation by means of *unrelated* colors is offered in the case of such phenomena, for example, as the distribution of different nationalities or religions within a country where no relationship in point of fact between the several elements exists. Where applied by Miss Addams in the Hull House Papers to show a hodge-podge of nationalities in the slums of Chicago the proceeding is perfectly scientific. But the occasions appropriate for such use are very seldom. And when unrelated colors are used by Miss Addams again to illustrate a graduated phenomenon, such as the average earnings of families ranging in a scale from \$5 to \$20 a week, the labor of interpreting the map is immeasurably increased beyond proportion. The evils of the employment of different colors appear perhaps more frequently in home-made wall maps than in the published charts and diagrams of professional statisticians, but the neglect of this cardinal principle is common enough to require mention, at all events, in this place.

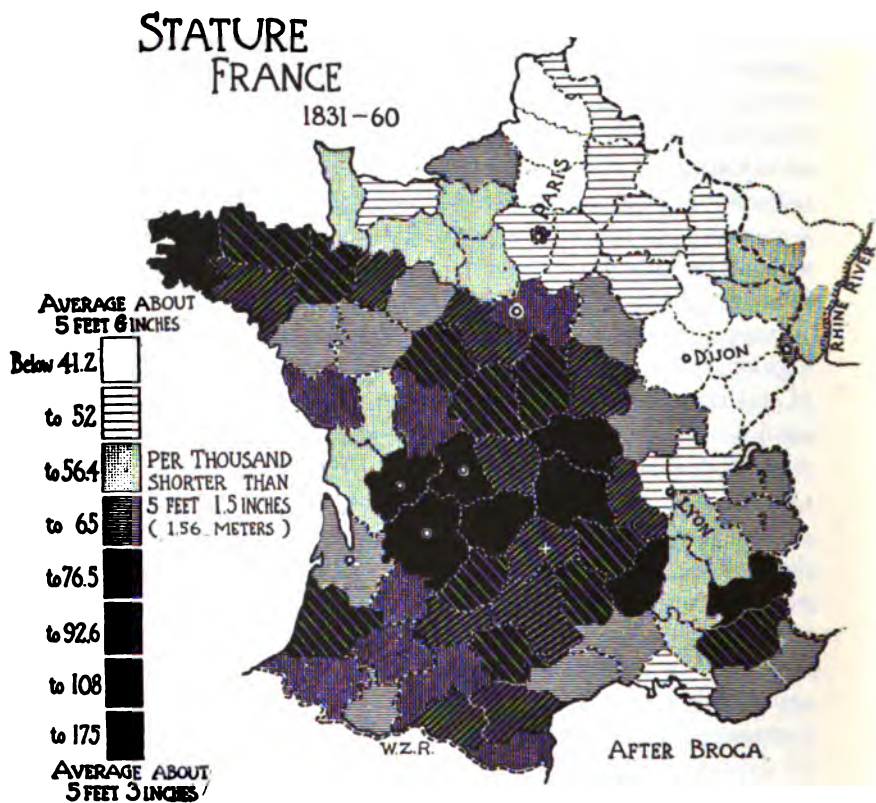
If colors are to be used at all they should either be confined to different intensities of the same color, or else, if the number of shades be too great, two colors, red and blue, for example, may be employed, the deepest tints of each standing at the extremes of the series, and each shading down to an almost white color where the two join at the

medial line. As an example of this mode of representation, see Turquan's map of the density of population in France, in the *Bulletin de l'Institut International de Statistique*.

A second principle in graphic representation is involved in the mere choice of the shading. The seriousness of the possible statistical error involved is manifested by comparison of the two maps of France on following pages. These are constructed from precisely the same data. As will at once be perceived, the graphic effect is entirely different in the two cases. The same shades are actually used, moreover; the only difference is found in the mode of grouping the various administrative divisions statistically. On both of these maps an attempt is made to represent the variations of a phenomenon—in this case it happens to be stature, but it might as well be suicide or any other demographic peculiarity—between the limits of 24 and 175 per 1000, respectively.

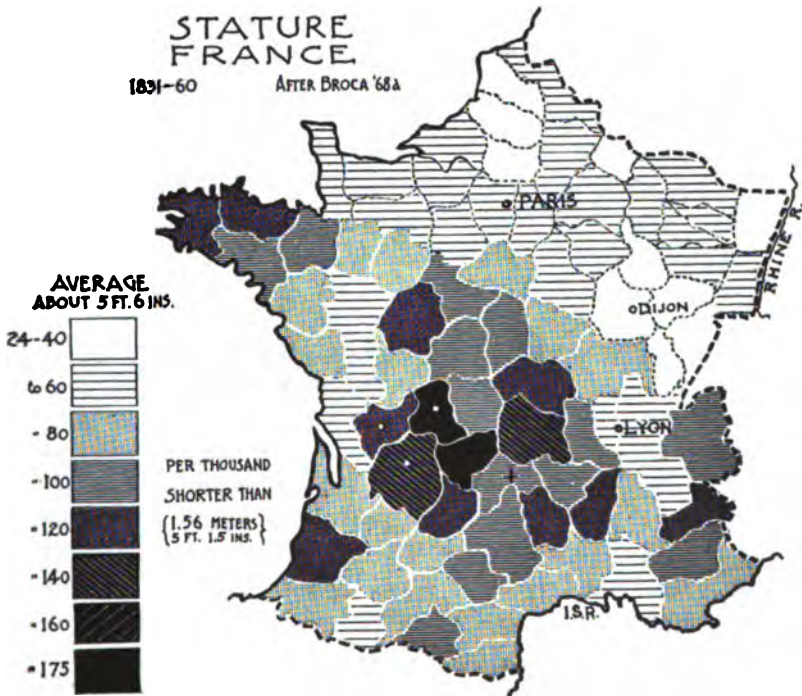
Suppose that we have decided upon the employment of eight grades of shading. How shall we effect the division of this range of 151 units, *viz.*, between 24 and 175 per thousand—into its eight grades, supposing that we have to do with 86 departments, as in the case of France? Broca, in his original map of stature used three shades only, each grade of tint being applied to one-third of the 86 administrative divisions. Thus, departments numbering 1–26 in the order of tallness of stature were made white; 27–52 were lightly shaded; and 53–86 were closely cross-hatched. In our first map, on the next page, precisely the same statistical plan was roughly adopted; although the number of divisions was increased from three to eight, thus assigning, approximately, 11 departments to each grade of tint. Following this plan, and having a table before us of the *pro mille* proportions for 86 departments, we designate the first 11 in order at the top by our lightest tint. It happens that the division falls, as the legend shows, at 41.2 per thousand. The first tint, therefore, has a range of 17.2 units, that is to say, from 24, the lowest proportion of defective statures, to 41.2 per thousand.

The second group of 11 departments similarly shaded carries us to a frequency of 52 per thousand, giving a range of 10.8 under the same tint. The third group of 11 departments happens to lie between the limits of 52 and 56.4 *pro mille* with a range of less than half the preceding one, or only 4.4. Thereafter the range of each similarly shaded group of 11



departments rises, as 8.6, 11.5, 16.1, and 15.4, respectively, until the last one reaches the maximum range from 108 to 175 per thousand. Nine departments, in other words, on this first map, as we see, are colored black, representing a range of 67 units per thousand (108 to 175).

The fallacy in this process is too apparent perhaps to need explanation; nevertheless it is surprising, in view of the simple principle involved, to see how commonly the error is committed, especially in the sciences which make but occasional appeal to statistical representation. The effect is at once obvious. The extremes of the statistical series, those departments within which the phenomena are respectively



most and least frequent, are shaded into undue geographical prominence and extent. Thus, for example, on this first map the areas of very short stature, characterized by great frequency of defectives, are much wider in their extension as visually represented than they are in fact. In other words, the restricted locality in which physical degeneracy really

culminates is generalized over a far larger area than it ought to be. The obvious fact that the phenomenon tends to aggregate about the mean or center is quite obscured at the same time.

The proper procedure in this case would seem to be not to divide the departments into shaded groups equal in number, but rather to divide the range of the phenomenon itself from least to maximum into equal groups. Thus, as on our second map on the preceding page, we make division at the round numbers of units per thousand, making each group of similar shading comprise 20 units per thousand, as the legend shows. The actual number of departments chancing to fall within each group of shading is left entirely dependent upon circumstances. All probability of course tends to make the middle groups numerically the most extensive, although this is not invariably the case. As it stands in this instance the number of departments represented as white on the map is 10; scarcely different from the number left white on the scheme used in the first map. This is a significant fact to be noted. The second shade, however, is far more extensive than in the former case, comprising no less than 26 departments instead of 11, as before; while the third tint covers 21 departments; the fourth, 15; the fifth, 10; the sixth, only 2; the seventh, not represented at all; and the eighth or solid black one covers only 2 departments. This distribution at once shows that the center of greatest frequency for the phenomenon in question really lies nearer the top of the scale than the bottom; in other words, that France, as a country, lies below the mean for the species in respect of stature. The commonest proportions, judged by that geographical distribution, lie in the vicinity of 60 defective individuals per thousand. This the map shows at once by its general light tone and shading, as it should. According to the first map, on the other hand, this center of distribution — or shall we say frequency — appears to be considerably higher at the middle grades of tint between black and white, namely, about 65 to

76 per thousand. This is obviously a falsification, to the eye, of the statistical fact, as a moment's consideration suffices to show.

The third point of principle to which we wish to direct attention is concerned with the lettering of the legend. This involves an error which is more frequent perhaps than either of the other two that we have mentioned. It arises more often from carelessness of the operator than from real confusion of thought. It is a fault which appears upon both of the two maps which have been reproduced herewith.

Suppose that the legend upon a map reads as follows: The first shade being labeled "1-10," the second "10-20," the third "20-30," etc. At what point does the real division statistically occur? Is No. 10.0 included in the first group, or does this alone comprise Nos. 1-9.99, inclusive? One is always at a loss to interpret a scheme of this kind, especially when division occurs other than at a round number; and it is in all cases probably far better to avoid the possibility of ambiguity by the employment of some other method. The several groups may be lettered "1-9 inclusive," "10-19 inclusive," etc., or else, what is probably better, they should be labelled "1-9.99," "10-19.99," etc. In this last case there is no possibility of misunderstanding, and the mind of the observer is immediately set at rest. When this is not done, nine times in ten the assumption is perhaps justified that this is what the statistics meant; but cases are no means rare where the opposite meaning was intended, especially whenever the division falls, as we have said, not on the round numbers but at some odd figures, as one, our first map of France, for example.

Having treated of these few points of principle we may now proceed to consider matters of technique. The first method we will call that of "pasting tints." The materials necessary are a piece of stiff cardboard large enough for the map; tracing cloth or paper, carbon paper for transferring tracings; and India ink, or what is even better, Higgins'

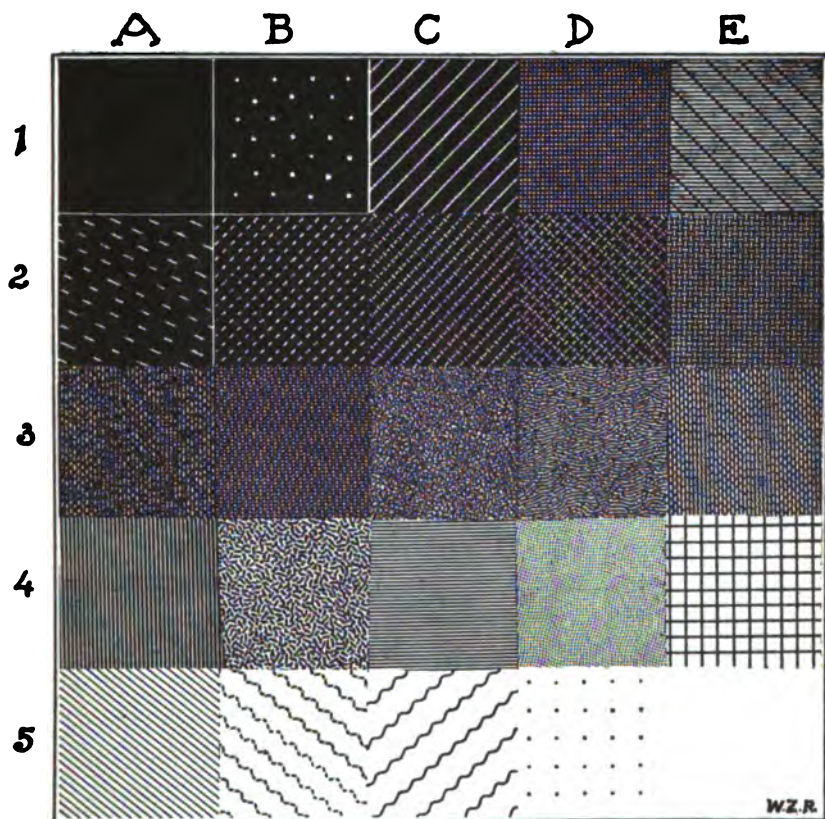
prepared drawing inks ; sharp scissors, a keen pen knife, a bottle of China white water-color paint, some flour paste, or preferably Higgins' Photo-mounter, etc.; and finally a set of black and white printed tint papers, such as, for example, those illustrated by sample in the diagram on the next page.

Having decided upon the grades of tint which we will employ, in accordance with the above mentioned principles, the following steps should be taken : —

(1) Make an accurate tracing of the outlines of the map to be constructed, and transfer it by means of the carbon paper to the stiff cardboard. The reason for the employment of cardboard is, of course, to prevent the curling and warping of the paper in the process of pasting. It will be found advantageous at this stage of the proceeding to paste the tracing along one edge of the cardboard so that it will accurately register or overlie the map as transferred upon the pasteboard. Then it may be folded back out of the way, except when needed for purposes of location. If a sufficient number of maps are to be made, printed outlines may in many cases be procured of publishers. We have, for instance, had such outlines prepared for the State of Massachusetts by counties and towns, the city of Boston by wards, etc.

(2) Beginning at one corner of our proposed map, let us say the upper left hand (A1 upon the diagram on next page), make a tracing upon the prepared tint paper by means of carbon paper of the department, county, township, ward or other administrative division to be shaded; and cut out the paper accurately upon its *upper* and *left-hand* sides only, along the lines thus traced. If these boundaries be straight and simple, as, for example, in the north-west corner of Massachusetts, they may perhaps, as we have said, be best cut out along the traced line. If, however, the map be for photographic reproduction, or if the outside boundary on these sides be irregular, such as a coast line, it will be found simpler to let the piece of tint paper extend out indefinitely, say one-quarter of an inch, beyond the boundary of the map

all along. Then having pasted the paper in its proper place upon the cardboard, as indicated by means of the tracing which may be folded down over the cardboard for the purpose of locating the pasting slip, paint over with China white all of the tinted paper which projects beyond the boundary,



inking in the actual edge of the map of course to give a finished effect. It will be noticed that no attempt has been thus far made to cut the *lower* and *right-hand* edges of this first piece of tinted paper accurately along these boundary

lines of the department, the paper having been merely left to project well over into the adjoining areas. (B1, B2, A2, on our diagram on the preceding page.)

(8) Make a tracing of the outlines of the area A2 which we will suppose to represent the adjoining state, county, town, or ward, as the case may be; and cut out a piece of the appropriate tint paper again upon the *upper* and the *left-hand* sides only, as in the former case, along the line of the tracing. Here, again, the *lower* and the *right-hand* sides are left to project indefinitely, well over beyond the boundary of this particular area. Paste this second tint paper in place; first, along its upper and left-hand sides, locating it by means of the general tracing of the whole map which, as we have already said, has been pasted to the cardboard by one edge and temporarily folded back out of the way. This will enable the tint paper to be brought accurately into register in its appropriate place. The area B1 is then similarly treated; then B2, A3, and so on; each tint paper overlapping its neighbor upon two sides only. In other words, we are simply shingling the map like a roof from its upper left-hand corner down and out, thus avoiding the difficult task of exactly fitting respective edges of the pasted papers together. This overlapping of the paper is not apparent on a photographic reproduction, especially since in most cases the lines where the shades overlap will be indicated by a black and dotted boundary, afterward inked in. Thus we proceed till the whole map has been covered. When we come at last to the lower and right-hand edges of the whole map we may either, as in beginning, cut all four edges of the last shade papers accurately, before pasting them in place; or, if the boundary be irregular, we may allow the paper to project beyond, and then paint over the superfluous part up to the boundary line with China white. Wherever covered with the white paint the projecting parts will disappear in a photographic reproduction which only takes note of clear black lines.

At this point a word may be said respecting the process of transfer and tracing by means of carbon paper. It will be found advisable to avoid, so far as possible, all black lines upon the face of the shade papers, as they are likely to smut and are difficult to obliterate. For this reason tracings of the outlines may best be transferred to the tint papers, either by indenting the outline by means of a dull steel stylus, or else the outlines may be transferred in carbon upon the *back* of the tint papers; that is, by laying the carbon paper face up upon the table, upon it place the tint paper the boundary of which is to be cut out and on top of all the tracing. Then by running a pencil or a steel point around the boundary of the tracing the carbon transfer is made upon the back of the tint paper instead of upon its face with far better results in the finished map.

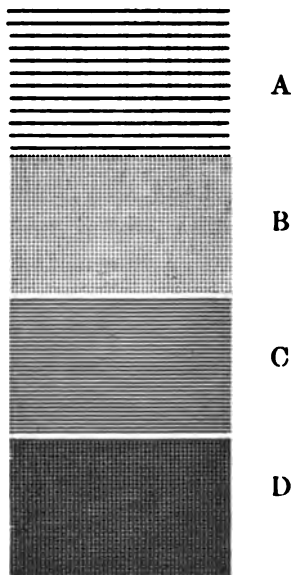
As for the tint papers to be used in this case a primary difficulty of course is to secure a sufficient variety of shades. Intermediate tones are common enough among artists' supplies in various forms, but we have found it necessary to make by hand a number of the darker shades, the varieties at hand being indicated within the diagram on page 9 to which we have referred. These must be adapted for each map, with an eye especially to the degree of reduction which is to be made by the photographer, as well as to the statistical contrasts which are to be sought. It is a well recognized fact that by choosing tints aright almost any desired effect of emphasis can be produced according to the skill of the manipulator. Most of these particular papers will stand a reduction anywhere up to "one-half off"; that is to say, a reduction of area of one-quarter, each dimension being halved. Many of the finer textured ones, however, will give far better effects with a less reduction, say "one-quarter or one-third off."

In the matter of shading it should be noted that the employment of flat colors, or tinting, except for solid black, renders the reproduction very much more expensive than in

those cases where a definite texture, either in black or other color, can be used. Wherever a texture, such as cross-hatching, dots, etc., can be employed, and where the reproduction is to be in black, the process of photo-engraving is possible, and the expense is relatively small. On the other hand, wherever flat tints, washes, or solid colors without texture are employed, it is necessary that the reproduction be by lithography or half-tone process, both of which are very much more expensive. For this reason it will be found far more advantageous to employ shades which have a texture such as those illustrated herewith than those of the other sort. Of course in drawing in any case the solid black areas are merely inked in with a brush, using a pure carbon drawing ink of the best sort. Ordinary writing ink is useless, as it gives a most imperfect black, full of faults in a photographic reproduction.

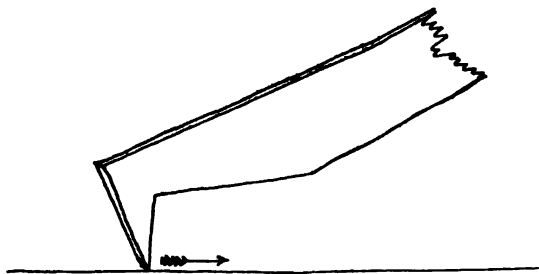
One more process somewhat more specialized deserves mention in conclusion. The credit for the original suggestion to me of this process is due to my artist friend, Mr. Frank B. Masters, who called my attention to the methods used in rapid illustration for newspaper work. Among these processes the best is perhaps the use of so-called Ross stipple-board. This is a paper with a thick clay surface minutely ribbed in one direction with black lines equally spaced at right angles to the ribs. Each black line upon this paper, therefore, runs up and down over a gridiron of ribs. To the eye this irregularity of surface is scarcely noticeable, and photographic processes take no note of them. Thus C upon our specimen diagram on the next page represents the paper as sold by dealers. Upon scratching it lightly with a broad sharp knife, the black lines are obliterated wherever they rise over and cross the ribs upon the paper, while the black remains in the intermediate hollows. By this simple means is produced the tint B. On the other hand, if rubbed with a pencil or greasy carbon the crests of all the ribs upon the paper are blackened throughout their whole length, producing

a series of cross lines at right angles to the original printed ones; thus is D produced. Of course all parts of the paper outside the map boundary are at the outset scratched white, a result easily produced, as the clay surface is intended for the purpose.



Beside these tints a number can be produced on Ross paper by various manipulations more or less complex and technical. Higgins' prepared or other India ink gives a solid color which may be punctured with white dots as in B1 (p. 9) by the use of a sharpened drill twirled between the fingers. This blackened space can also be scratched white in lines as readily as black lines are drawn with a pen. For this purpose we have devised a tool, shown in the cut on page 14, made from a bit of old saw blade or thin steel, ground to a chisel point. This is used with a ruler just as a pen to produce the effects; for example, shown in Nos. C1, A2 (p. 9). Or the Ross paper before being blacked may be deeply cut with this tool in any way desired and thereafter coated with ink

by brush. Thus the ink lines become deeply indented below the surface of the paper. Then if the whole surface be lightly scratched with a penknife, the tops of the original ribs on the Ross paper come out white, leaving the effect shown, for example, in No. E1 (p. 9). Finally by using the same steel tool, with a point of the right breadth, any desired number of intermediate black lines on the original Ross paper can be removed leaving a few widely separated ones with the effect of light cross-hatching, as in A on page 13. Such are only a few of the results possible. Ingenuity will enable others to be devised to fit the peculiar circumstances; and then of course, best of all, these results may be combined with those of the pasting tints previously described, so that almost any desired number of tints between black



and white may be obtained. All of these latter processes, however, and even the simple use of the Ross paper, presuppose more skill than the average student can acquire in a short time. Experience has shown that the simplest process gives the best results. The appended map, by wards, of the city of Boston represents the work of a first-year student at the Institute of Technology. It required about eight hours to make in the first attempt. This was photo-engraved with a reduction of about "one-half off," at a cost of, approximately, \$4.00. Such work is easily within the powers of any student of statistics, and will be found greatly to increase the interest in research. It is merely a legitimate application of those laboratory methods which should receive far more consideration than is usual in many of our educational institutions.

THE PORTUGUESE POPULATION IN THE UNITED STATES.

BY **FREDERIC L. HOFFMAN.**

According to the United States Census of 1890 the majority of the Portuguese in the United States lived either in California or Massachusetts. In the latter State there has been for some years past a considerable increase in this class of foreigners, which according to the State Census of 1895 numbered 18,298 in that year. Taking the returns for 1895, it appears that of the last named number the majority, 7263, lived in the county of Bristol, which contains the three important cities of Fall River, New Bedford, and Taunton. The following table will show the proportion of Portuguese in the principal towns of Bristol County in 1895:—

PORTUGUESE IN BRISTOL COUNTY, MASSACHUSETTS.

	Total Population.	Portuguese.	Per Cent.
Fall River	89,203	1,707	1.9
New Bedford	55,251	3,861	7.0
Taunton	27,115	536	2.0

Hence the three large towns contain 6104 of the 7263 Portuguese in Bristol County, or 3.6 per cent of their population is made up of this class of foreigners. But because of this apparent concentration it must not be supposed that these people largely aggregate in large cities, for as a matter of fact they are largely employed as farmers and truck-gardeners in the suburban sections, as domestics or farm servants, and as fruiterers all over the rural part of the county. Seven cities with a population from 2500 to 8800 contain 520 Portuguese, or 1.6 per cent of the total population, while the remaining part of the county, practically the rural portion, contains 639 Portuguese, or 4.2 per cent of the total population.

The Portuguese in Massachusetts are mainly from the Western Islands, including Madeira and the Azores. The latter islands in 1890 had a population of 389,684, or 814.9 to the square mile, while Portugal itself had a population of only 135.7 to the square mile. This over-population of the islands has for some twenty years at least led to a considerable emigration of Western Islanders to all parts of the world, but especially to the Sandwich Islands, Brazil, British Guiana, and the United States. For some curious reason the emigrants to the United States have mostly come from Fayal, San Jorge, and Flores, while those to the Sandwich Islands have come principally from Madeira, and those to Brazil from the islands of San Miguel, Santa Maria, and Terceira.

This distinction of the origin of the American-Portuguese immigration is of some importance in view of the fact that there may possibly be shown to be certain important differences in the racial types of the inhabitants of the different groups of islands. Since the possible African origin of these people is oft referred to, the following notes on their anthropology are of importance for a clear conception of the complex question of race origin and race mixture.

Elisée Réclus, who is generally accepted as a high authority, writes as follows in reference to the inhabitants of the Azores: "When first visited by the Italian and Portuguese navigators the Azores were found to be uninhabited. The pioneers of the colony founded in 1644 . . . were some Moors, sent forward to test the climate of the country Afterwards the large owners of estates introduced with the white peasantry a certain number of black slaves, by whom a slight strain of black blood was transmitted to the other settlers." Jews were also sent to the colony, and some Flemish colonists, but the vast majority of the original settlers were pure Portuguese, which, however, probably came from different parts of Portugal, and thus may come the different characteristics of the inhabitants of the various islands. Thus, according to Réclus, the Azorians are far from present.

ing a uniform type, the greatest variety being presented by the different communities throughout the archipelago. "They are generally under-sized, with rather coarse features, large mouth, thick lips, ill-shaped nose, and cranial capacity decidedly inferior to that of the average European." Thus Réclus would seem to accept it as a fact *that the Azorians have a slight mixture of negro blood.*

In the same way after discussing the character of the people of Madeira, Réclus writes, "All these heterogeneous elements (Jews, Moors, Negro slaves, English, and Italian) became successively absorbed in the dominating Portuguese race, and nearly all the inhabitants have black eyes, coarse dark hair, and a swarthy complexion, far too general not to be attributed in many cases to a Negro strain." This agrees with a statement made in 1857 by the author of a *Handbook of Madeira*, in the following words: "The inhabitants of Madeira are of Portuguese descent, and are not distinguishable from their relatives in Portugal, save by a certain provincialism in their speech, and a somewhat dark tinge on the skin of the lower classes, *speaking of an admixture of African blood.*"

But what is said here of the Portuguese in Madeira and the Azores applies with much truth equally well to the native Portuguese and even the Spaniards, for in the words of Professor Ripley, "Beyond the Pyrennees begins Africa" and "the Iberian population, thus isolated from the rest of Europe, are allied in all important anthropological respects with the peoples inhabiting Africa north of the Sahara from the Red Sea to the Atlantic." Thus Ripley seems to accept the theory that the Portuguese in Portugal became inter-mixed with the Saracens and Moors during the occupation of the Peninsula by the latter, and that hence "the effect of a Moorish cross is apparent." We must, therefore, conclude that the Portuguese of Portugal, as well as those of the Western Islands, have become somewhat tainted by the inter-mixture with the races of North Africa, while some real

Negro blood, no doubt, crossed with that of the people of the Azores and Madeira several centuries ago. But this strain must be considered as unimportant from a physiological point of view, and does not, to my mind, represent a factor detrimental to the health or longevity of these people at the present time. It is a generally accepted fact that the people of Southern Europe can mix more readily and with less moral or physical injury with the Negro than the Teutonic races of Northern Europe.

But for these reasons some of the statistically supported conclusions as regards the comparative longevity of this class of people would seem impossible. Either the black strain is so very slight that it failed to deteriorate the Portuguese in the Western Islands, or the race mixture of Moors and true Negroes with the Portuguese proved a less serious deterioration than is the case in race mixtures of Anglo-Saxons with persons of the African race. Thus if we first compare the general mortality of the Portuguese in Portugal and the Portuguese in the Western Islands, we have the following results:—

COMPARATIVE MORTALITY OF PORTUGUESE IN PORTUGAL AND THE WESTERN ISLANDS. (Rate per 1,000 of Population.)

Portuguese in Portugal, 1895-96,	22.6
Portuguese in Western Islands, 1895-96,	22.2

According to this table the general mortality of the two groups of Portuguese people is practically the same.

But as a matter of fact the mortality of the Western Islands is actually less than that shown in the table, since the use which is made of Madeira as a health resort increases the local mortality considerably, so much so that Madeira has been termed a London cemetery. Considering the returns from Funchal, Madeira, for the eighteen months January-June, 1897-98, I am able to give the following table, through the courtesy of the United States consul at Funchal:—

19] *The Portuguese Population in the United States.* 381

MORTALITY OF FUNCHAL, MADEIRA, 1897-98. (Rate per 1,000 of Population.)

	Funchal.	New York City. ¹ 1885-90.
Consumption	2.18	3.80
Respiratory diseases	3.23	5.63
Typhoid fever	0.85	0.23
All causes.....	27.22	28.47

¹ White population only.

It is thus apparent that from specific causes affecting the adult population, the mortality is lower in Funchal, regardless of the invalids from Europe, than in the city of New York. Comparing, for instance, the mortality of the people of Funchal with the mortality of the Irish and Germans in New York City, it appears that while the death rate for consumption is 2.18 per 1000 for Funchal, it is 6.49 per 1000 for the Irish, and 8.18 per 1000 for the Germans of New York City. Just so with respiratory diseases and typhoid fever, which latter disease, however, is comparatively frequent in the Western Islands. As regards the general mortality of Funchal my correspondent in a long report states the facts as follows: "Suffice it for me to say that among the poorer classes you find terrible poverty, nay even starvation, combined with every form of bad sanitation and excessively exhaustive work." "Consumption is on the whole fairly small in amount, and this is increased by imported cases." "Respiratory diseases are very common among the poor, who get wet through in the winter months, and have no opportunity of drying themselves, and altogether they are very thinly clad." But he adds, "Even among the poor, very old people are frequently found enjoying the best of health and capable of a great deal of exertion." The report was made especially for me by Doctor Krohn, who is thoroughly familiar with local conditions.

Other authorities agree very much on the general conclusions stated in regard to the mortality of the Western Islands.

Davidson says "Respiratory diseases are rather common among the laboring classes," while consumption is not at all uncommon among the lower classes, but rare among the upper classes. The mortality among children would seem to be high, though accurate data are wanting. Davidson says that *tabes mesenterica* is very fatal among ill-fed children of the poor, but *scrofula* is not of frequent occurrence. "Syphilis," he, however, adds, "is widely spread, but of a mild type." Among races which have been mixed with essentially unlike races, like the American mulatto or the Hawaiian half-cast, *scrofula* and syphilis are not only very common, but of exceptionally virulent type. Réclus agrees that the population increases rapidly by a natural excess of births over deaths, families being very numerous, and the death rate among children very low. The latter is hardly supported by some of the facts previously stated, still the mortality cannot be as heavy as among the colored population of our American cities. Of Madeira, Réclus writes that rickets, *scrofula*, consumption, and even leprosy prevail as in the mother country, but the mortality from these causes cannot be large, since there is a very considerable excess of births over deaths. (1896, 13,335 births and 8761 deaths.)

These facts are supported by the available vital statistics of the Western Islanders in the United States, Hawaii, and other countries. When the emigration from Madeira first commenced to British Guiana there was a very high mortality, but this was due entirely to local causes, especially to yellow fever and unfortunate conditions connected with the transportation of the emigrants. In course of time the settlers became adjusted to local conditions, and now with their descendants number 12,166, having increased from 6879 in 1881 to the 12,166 in 1891, being considered "a most valuable class of immigrants."

In Hawaii, Portuguese, especially from Madeira, have been settled as plantation laborers on the sugar estates since 1878. Including their descendants, at the present time there

21] *The Portuguese Population in the United States.* 333

are some 18,000. According to a high authority, "the Government built better than it knew" in bringing the Portuguese to the islands. The following table for the city of Honolulu will show that the general death rate of Portuguese is less by about one-third than the rate for the total population:—

MORTALITY OF PORTUGUESE IN HONOLULU. (Rate per 1000 of Population.)

	Total Population.	Natives of Portugal. (Western Islanders.)
Period 1891-97,	24.4	16.5

According to this statement the average annual mortality of Honolulu during the period 1891-97 was 24.4, while, considering the Portuguese alone, the death rate was only 16.5 per 1000. Hence the Portuguese from the Western Islands were subject to a much lower death rate in the Sandwich Islands than the general population during the same period.

If we now consider the facts pertaining to this country we are confronted with a much-to-be-regretted paucity of data. As stated, the Portuguese population in Massachusetts is concentrated in the county of Bristol, and it is only for Fall River that I am able to give the mortality returns for a short period of years and for a small number of persons of this nationality living in that city:—

**MORTALITY OF PORTUGUESE IN FALL RIVER, BRISTOL COUNTY, MASSACHUSETTS.
(Rate per 1000 of Population.)**

	Portuguese.	Total Population.	Canadian.	Ireland.
1891.....	3.5	23.5	9.1	32.2
1892.....	7.0	23.5	9.3	30.6
1893.....	10.0	23.2	8.9	29.2
1894.....	13.5	23.5	8.7	29.4
1895.....	14.6	21.3	9.9	26.7
1896.....	21.7	23.8	14.4	26.3
1897.....	11.7	22.3	13.4	30.1
1891-97.....	11.7	23.0	10.5	29.2

It appears from this table that the average annual death rate of the Portuguese, largely Western Islanders, was 11.7 per 1000, against a rate of 23.0 per 1000 for the total population. The high average for the total population is no doubt due to the excessive mortality of the Irish, which show a death rate of 29.2 per 1000, while the sturdy Canadians show a mortality of only 10.5 per 1000. Hence the returns for the Portuguese are indicative of a low mortality among this class of foreigners in the city of Fall River during the past seven years.¹

The conclusion is warranted that on the basis of the local mortality statistics for the Western Islands; on the basis of the mortality statistics for the Hawaiian Islands, where these people have largely settled; on the basis of the returns for the city of Fall River, and on the scanty material in the possession of insurance companies, the mortality of Portuguese, especially Western Islanders, is below the general mortality of Portuguese in Portugal, and considerably below the mortality of the Irish and Germans in the United States.

To these facts pertaining to the mortality and disease liability of the Portuguese population, I add a few statements and statistics relative to the moral and material condition of the Western Islanders as they have been brought out in various investigations into their social and industrial capacities, and although the subject received public attention in a valuable report of the Massachusetts Bureau of Labor on the *Social and Industrial Changes in the County of Barnstable* (27th annual report, 1897), the following extracts and statistical tables will be of interest and value as confirming the conclusions arrived at by other investigators.

In a work on Madeira, published in 1857, a well-informed writer states, "While the lower classes of Madeira are sober, good-tempered, and cheerful, notwithstanding the privation

¹ The age distribution of the population is somewhat in favor of the Portuguese, but not sufficient to affect the much higher death rate of the Irish. The mortality by ages cannot be stated according to nationalities.

of their lot, they are grossly superstitious" (p. 78), and "acts of violence seldom occur, and the most heinous crimes are seldom committed. Petty thefts, however, are common, and strict integrity is nearly unknown." In this manner most writers have expressed their high regard for the Western Islanders, as a hard-working, patiently toiling, uncomplaining, and law-abiding class of people. Thus Earl Grey in 1852 referred to the immigration from the Azores into British Guiana as "this invaluable class of immigrants." William N. Armstrong, as Immigration Commissioner for Hawaii in 1882, wrote of the Portuguese from the Western Islands, "these people are excellent laborers." Prof. W. Alexander, in a paper before the Honolulu Social Science Association in 1895, referred to the Portuguese in the islands as follows: "They are the most valuable accession yet made to the population of this country"; and further, that "their industry and thrift need no praise from me while the reports of the Chief Justice credit them with the lowest percentage of crime of any nationality in the islands."

So, also, in a report made by the United States consuls in 1885 on labor in Europe, it is stated of the laboring people of the Azores: "The habits of the Fayalese working classes are fair. They are temperate, and although making use of wine and spirits, drunkenness is by no means common. The agricultural population is decidedly a steady one, and necessarily frugal. When abroad in countries where good wages are to be had they are very saving, and those who return, or a large majority of them, bring with them good results of their labor and thrift" (vol. ii, p. 1648). Mention is made of the existence of a coöperative society in Fayal, which requires weekly payments to be made, and which would have been more successful but for the poverty of the people.

Again, as to the Western Islanders in southeastern Massachusetts, the probation officer of New Bedford stated before the Massachusetts Commission on the Unemployed in 1894, "They are generally very prudent and good citizens," while another witness from New Bedford stated, "They are very

thrifty." These statements may be supported by statistical data, of which I give two significant items below.

It is a well recognized fact that a low state of morality among civilized people is invariably coincident with a high rate of mortality. It is thus that the Negro in the United States is among the least moral, and at the same time the most liable to disease and death, while the Jews are among the most moral, and at the same time enjoy the largest share of human longevity. Thus it is of importance to note that the ratio of illegitimacy among the Portuguese in Portugal is 15.1 per cent of the total number of births, while it is only 5.1 per cent among the Western Islanders, which is a ratio about 2 per cent higher than that of the white population of Washington, D. C. Thus while it is safe to say that the mortality of the Western Islanders is lower than that of the Portuguese in Portugal, it is certain that the morality of these people is very much higher than that of the natives of Portugal in their home country. In support of the statement that crimes and acts of violence are less common among the Western Islanders than among other nationalities, I add the following table for Massachusetts, showing the proportion of persons committed to jails and houses of correction during 1898, according to selected nationalities:—

PRISONERS COMMITTED TO JAILS AND HOUSES OF CORRECTION IN MASSACHUSETTS, 1898.

Nativities.	Population. (1896)	Prisoners. (1898)	Ratio per 10,000.
Portuguese	13,298	14	10.5
Western Islanders only	9,898	4	4.0
Natives of France	3,742	35	93.5
" of Poland	7,277	89	122.3
" of Sweden	23,541	280	98.1
" of Ireland	258,247	7,448	288.2

Thus it is shown that the natives of the Western Islands in the State of Massachusetts are the least criminally inclined of the nationalities stated, while including the Portuguese from Portugal the ratio is only 10.5 per 10,000, against 288.2 for the Irish.

REPORT ON UNIFORM FINANCIAL SCHOOL REPORTS.

The following report was submitted by a special committee of the National Education Association to the Department of Superintendence at a meeting recently held in Columbus, Ohio: —

Your committee, appointed at the Chattanooga meeting of this body to report upon some uniform style of financial school report for the use of cities or school districts, and also upon some form suitable for the use of State school systems, begs leave to report as follows: —

The committee has not found it practicable to have a meeting of its members before coming to Columbus. Discussion of the matters committed to it has been carried on by correspondence, both between members of the committee and with others.

The printing of this report, so that it might be in the hands of the members of the department at this meeting, was authorized at the time this committee was appointed, but, in view of the fact that the members have not been able to meet for final discussion of the matters intrusted to them until the assembling of the department in Columbus, it seemed best to have printed only the proposed form.

It is not probable that any form for financial school report could be presented which would be entirely satisfactory to everyone. Your committee is of the opinion, however, that most persons would agree on nearly all important items, and that an agreement should be made throughout, even though, to some, the classification of a few minor items seem arbitrary or incorrect.

While local conditions enter into necessities for expense in any public school system, yet one of the most useful means of estimating proper expenditures, and the necessity for particular expenditures, should be afforded by a study of the financial school reports of other similar cities or districts. As these reports are at present made, they are of little use in this respect. Items given in one report are omitted from another. Items of income or outgo are differently grouped in different reports, and the statement is made in such a way that it is impossible to separate the items for the purpose of reclassification. In getting the cost of education per child, different items are put into the total cost of education, which forms the divi-

dend, while sometimes the divisor is the number enrolled, sometimes the average number in daily membership, sometimes the average number in daily attendance.

One of the chief studies of a wise administrator of schools is to make the cost of education per child as low as consistent with the best service. Attention to this and to a comparative study of reports for a period of years, now that most of our school systems have become established on a somewhat similar plan, should give an idea of the average or normal cost of education per child. Having this, the manager of schools may know how expense in his system differs from this normal standard, and, if not normal, why it is above or below. This knowledge cannot be arrived at, however, until the same items are included when computing cost of education and the same divisor is used in obtaining the average. By careful comparative study, railroad men know the average cost of hauling freight per ton per mile, and the cost per mile of transporting a passenger. Those administering schools should be as well informed upon the cost of education.

The two things which one studying a report of school finances most desires to know are, first, the rate of direct local taxation for schools borne by the community reporting, and, second, the average cost per child per year for the usual educational expenses. There are many items which, when given, are explanatory of these two, and serve to correct the inferences which might be drawn from a bald statement of them. There are also many items, not directly related, which aid in giving a correct estimate of the conditions surrounding the school organization reporting.

PROPOSED FORM FOR
REPORT OF THE SCHOOL RECEIPTS AND EXPENDITURES OF THE CITY
(OR SCHOOL DISTRICT OR SCHOOL CORPORATION)

of _____ for the year ending _____ 19____

- | | |
|--|---------|
| 1. Estimated actual value of all property in the city (or school district or corporation)..... | \$..... |
| 2. Assessed valuation of all property in city (or school district or corporation)..... | ..... |
| 3. Rate of school tax levied on each dollar of assessed valuation of city (or school district or corporation). ..... | ..... |

RECEIPTS.

- | | |
|---|---------|
| 4. Received from State apportionment or taxes..... | \$..... |
| 5. Received from county apportionment or taxes..... | ..... |

6. Received from city (or school district or corporation) taxes.....	.....	.....
7. Received from fines, licenses, penalties, etc.....	.....	.....
8. Received from all other sources except loans and bond sales. (Specify different sources).....	\$.....	.....
9. Received from loans.....	.....	.....
10. Received from bond sales.....	.....	.....
11. Total receipts, all sources.....	.....	.....
EXPENDITURES.		
12. Paid for salaries of teachers and supervisors.....	.....	.....
13. Paid for other current expenses, excluding interest :—		
Salaries of officers.....	.....	.....
Janitors.....	.....	.....
Fuel and lights.....	.....	.....
Text-books, including copy and drawing-books....	.....	.....
Stationery.....	.....	.....
Other supplies for schools.....	.....	.....
Ordinary repairs to buildings, etc.....	.....	.....
All other current expenses.....	.....	.....
14. Paid for sites.....	.....	.....
15. Paid for additions and new buildings.....	.....	.....
16. Paid for permanent furnishings and furniture.....	.....	.....
17. Paid for permanent equipment for manual training, science laboratories, etc.....	.....	.....
18. Paid for reference and library books.....	.....	.....
19. Paid for all other permanent improvements, such as grading, paving, etc. (Specify different expenditures).....	.....	.....
20. Paid for interest.....	.....	.....
21. Paid on principal of loans.....	.....	.....
22. Paid on principal of bonded debt.....	.....	.....
23. Total paid out, all purposes.....	.....	.....
24. Cash on hand at beginning of year.....	.....	.....
25. Cash on hand at beginning of year in fund for sites and buildings. (Included in 24). ....	.....	.....
26. Cash on hand at beginning of year in sinking fund. (Included in 24). ....	.....	.....
27. Warrants outstanding, beginning of year.....	.....	.....
28. Cash on hand at end of year.....	.....	.....
29. Cash on hand at end of year in fund for sites and buildings. (Included in 28). ....	.....	.....
30. Cash on hand at end of year in sinking fund. (Included in 28). ....	.....	.....
31. Warrants outstanding at end of year.....	.....	.....
32. Paid current expenses, evening schools. (Included in 12 and 13). ....	.....	.....
33. Paid current expenses teachers' training schools. (Included in 12 and 13). ....	.....	.....
34. Paid current expenses, schools for defectives or other special schools. (Included in 12 and 13. Specify different schools).....	.....	.....

35. Bonded school debt of city (or school district or corporation) at end of year .....	.....
36. Population of city (or school district or corporation) ..	.....
37. Persons of school age to years, inclusive, in city (or school district or corporation) .....	.....
38. Number pupils enrolled, all schools .....	.....
39. Average number in daily membership, all schools ...	.....
40. Average number in daily attendance, all schools. ....	.....
41. Average number in daily attendance, night schools. (Included in 40) .....	.....
42. Average number in daily attendance, teachers' training schools. (Included in 40) .....	.....
43. Average number in daily attendance, schools for de- fectives or other special schools. (Included in 40. Specify different schools) .....	.....
44. Annual cost of education per pupil. (Sum of Nos. 12 and 13 divided by No. 40)	\$.....

In arranging the proposed form an attempt has been made to group items so that the two prime facts which such a report may show may be easily determined; and to give, in addition, information of interest and use in such comparative study of income, outgo, and conditions as those charged with the management of school systems find it profitable to make.

The heading of the blank form was, at the suggestion of members of the committee, made to cover cities, school districts, or school corporations. In some cases the city and the school districts have the same boundaries; in other cases the school district covers territory not included within the limits of the city; in some cases the title varies, and the school district is called a school corporation. The proposed heading will permit the form to be used not only for cities, but for any school district, or for any form of organization the purpose of which is to carry on public schools.

Taking up the items of the form, Nos. 1, 2, and 3 serve to show the rate of local school tax, and to determine how this rate in one system of schools compares with that in another. The proportion of the true value at which property is assessed for purposes of taxation varies so in different States and different cities that all of these items are necessary that a comparison may be made. A tax of seven mills on the dollar, where property is, as in some cases, valued for taxation at only one-tenth of its actual value, is really much lower than a tax of four mills in a city where property is valued for taxation at two-fifths its actual value. The tax of seven mills on the one-tenth

valuation might be increased on the same valuation to a tax of sixteen mills before it would be as great in reality as the four-mill tax on the two-fifths valuation. A tax of six mills on the dollar where property is assessed at one-fourth its actual value is in reality only one-half as great as a tax of three mills where property is assessed, as in Massachusetts and in some other States, at its full actual value. With the figures given in Nos. 1, 2, and 3, valuation and tax rate may be reduced to a common basis, and fairly compared.

Under the head of receipts, the ordinary and extraordinary sources of income are separated. The ordinary sources, items 4, 5, 6, 7, and 8, serve to explain each other, and also to explain No. 3. In some States little or nothing is received from State distribution or funds; on the other hand, in at least one commonwealth, this State school fund is so generously endowed that, with prudent care, it should, in the future, carry a large part of the expense for public education. Where this source of income is large, the necessity for local taxation is correspondingly reduced. In cases where the county figures to a considerable extent as the unit of taxation the necessity for tax in the local school district is likewise lessened. In many cases the amount received into the school fund from fines, licenses, and penalties is considerable. On the other hand, this source of revenue is sometimes large, in some cases even providing the greater part of the funds needed for the maintenance of the schools. Where such a condition as this exists, the necessity for taxation, of whatever sort, is materially reduced. Cities or districts sometimes have unusual or temporary sources of income — gifts or bequests, interest on permanently invested funds, tuition of non-resident pupils, etc. These items, indicated in No. 8, serve to put all the facts before the reader of the report.

Receipts from money borrowed and from the sale of bonds are not natural or regular sources of income. The receipts from the sale of bonds are generally to be applied to some particular purpose, usually the purchase of sites and the erection of buildings. Income from loans is a temporary makeshift. Nevertheless, these two items must be reported to give a correct understanding of the situation.

Expenditures seem to fall into three classes: the usual current expenditures necessary for the maintenance of the schools; expenditures for sites, buildings, permanent improvements, and equipment; other

expenditures which, for various reasons, are not put in either of the two preceding classes.

For the purpose of this report the first of these classes is by far the most important, for it would probably be conceded that from this item of current expenses should be determined the cost of education per child, the most important item to be shown. Most of the difficulties in preparing such a form as is here proposed are met in the attempt to agree upon the items which should be included and those which should be excluded from item 13. Item 12 is simple, including only expense for regular and special teachers, and for those engaged in supervising or directing the work of instruction. An agreement is easily reached upon most of the elements making up the total in No 13. Here, without doubt, belong all expenditures for salaries of executive officers of the board; salaries of janitors; fuel; light; water, where this is purchased; material and labor for ordinary repairs to buildings and premises; the care of grounds; text-books, where these are owned by the school board; school stationery; school supplies, both those of janitors and those used in the work of instruction; cartage and freight; advertising; election expenses; school census; legal expenses; postage; telegraph and telephones; etc. Your committee would also include sums paid for rooms or ground rented for the use of the schools. It may seem inconsistent to include rent here, while excluding interest paid, and interest estimated on value of buildings and grounds used for school purposes. Rent, however, is seldom a large item, and it seems best to class it as current expense.

Actual usage as to items included in "cost of education" varies widely in different cities. Perhaps in one case only part of what is included in No 12, simply the expense for teachers, is included. In another city the cost of instruction and supervision, all of No. 12, is included, and this is reported as "cost of education." Sometimes to these items is added cost of janitors, fuel, and school supplies, while all other items are omitted.

It has been urged that to the items grouped under No. 13 should be added the sums paid for interest, and also a sum for interest, estimated at the current rate, upon the value of all grounds and buildings owned by the school district and used for school purposes. The item of interest paid upon bonds or upon temporary loans has been

arbitrarily excluded from No. 13. This has been done because interest is not directly an expense for educational ends; because in many cities no debt exists and no interest is paid. If the item is included, it will in some cities weigh unduly in the showing of the cost per child. Whether school buildings and grounds shall be purchased by direct appropriations of funds from the school treasury, or by funds derived from the sale of bonds, is a matter regulated by each community for itself, under state laws, and one plan or the other is followed, as the particular community considers advantageous. The matter is largely out of the management or control of those directly charged with administering the schools. Your committee has, therefore, recommended this exclusion.

The question might be raised as to including in No. 13 the interest upon estimated value of buildings and sites and permanent equipment. While it is true that the community is permanently deprived of the use for other purposes of the sums invested, its inclusion would be a wide departure from any prevailing usage. Estimates of the value upon which interest should be computed would vary largely, as one person after another, in different years, was called upon to make the estimate, and the item would become a variable factor, causing apparent cost of education to show strange increase or decrease. Your committee has, therefore, considered it wiser to exclude both interest paid and interest estimated from "cost of education."

Items 14 to 19, inclusive, show permanent investments in plant. The items are separated, because it is desirable to know amounts expended for each purpose. Some little perplexity may arise in classifying expenditures under Nos 16 and 17. Probably window shades and poles, and carpets, should go under 16, while door mats should go with brooms under 13. The repairing or replacing of shades should probably go under 13 also. Maps, charts, globes, etc., with all original fitting up of laboratories and workrooms, as well as additions of permanent pieces of apparatus, belong under 17; while the repair of apparatus and the replacement of the daily consumption and small breakage of laboratory material and utensils should be counted under 13, as should rebinding and repairs of library and reference-books. Bookcases, etc., an improved heating plant, a new system of ventilation put in a building, fall naturally under 19.

Items 20, 21, and 22, not placed with either of the foregoing classes of expenditure, are desirable for information, and are therefore included.

Although this form for report does not resemble a book-keeper's balance sheet or exhibit, yet item 24 is desired as a matter of information, as is also item 27. Items 25 and 26 are necessary to give a correct understanding of the significance of item 24. Items 28 and 31 are also desired as items of information, important as giving a full knowledge of the situation which exists in the reporting district. Nos. 29 and 30 modify considerably the significance of 28.

Items 32, 33, and 34 give an opportunity to estimate the cost of ordinary schools, free from complications with the unusual schools indicated in these items. They also give information as to what extraordinary educational responsibilities are assumed by the community.

Item 35 is inserted simply as information often desired, but frequently omitted from school reports.

Item 36 sheds light on the item following, and both of them are things well to be known when considering items 38, 39, and 40. These facts are not all strictly related to finances, but help in a view of the whole situation. They should often be borne in mind as correctives when considering items 3 and 44.

Items 41, 42, and 43 bear the same relation to 40 that 32, 33, and 34 do to the sum of 12 and 13. They permit the cost of education for the common schools to be separated and computed apart from that of the schools for special classes or purposes indicated in 41, 42, and 43.

There will no doubt be criticism of the selection of No. 40 as the divisor in obtaining No. 44. Both No. 38 and No. 39 were considered.

No. 38 varies so in different cities in proportion to the school population, and the average number of days each pupil enrolled is in attendance during the year varies so, that this does not seem to provide a divisor that is in any degree stable or reliable. Neither does the enrollment, in any great degree, determine the number of teachers or the school accommodations necessary.

For many reasons No. 39 seems the most suitable divisor. If computed in a uniform manner, the figures showing number in average daily membership would most nearly show the requirements for schoolrooms, furniture, supplies, and teachers. But it is not true

that these figures are obtained by the same processes, or based upon the same facts, in different school systems. Usage varies so in computing membership in different schools — pupils in some cases being counted as members of the schools, when in other cities the same state of facts would cause the child to be considered as no longer a member of the schools — that fair comparison is apparently not practicable by the use of this divisor.

Your committee is of the opinion that a divisor as little subject to misunderstanding as possible, and one based upon facts which are obtained in the same way everywhere, is of the first importance. The members believe this is provided by item 40, and we have, therefore, made that item the divisor to be used, in connection with items 12 and 13, to obtain what shall be known as the "cost of education."

Your committee further recommends that the accompanying form for reports of cities or school districts be used as a basis for uniform financial reports by State superintendents of public instruction.

Your committee finds it impracticable, without further time than has been at the disposal of its members, to present a suitable form for report showing important facts as to finances of State schools and educational institutions other than public schools.

Respectfully submitted,

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MISCELLANY AND NOTICES.

MEMORANDUM ON EFFORTS TO DETERMINE THE AREA
AND POPULATION OF THE PHILIPPINE ISLANDS.¹

Area.—The accuracy of any determination of considerable areas, such as these islands, depends on —

1. The accuracy of the surveys.
2. The accuracy of the maps constructed from these surveys.
3. The accuracy of the measurements made on the maps.

About the progress and trustworthiness of the *surveys* of the Philippine Islands I have thus far obtained no specific information. Doubtless they are very imperfect and inaccurate.

The maps which have been used for determinations of area, so far as I have ascertained, are these : —

1. An undetermined map made prior to 1858 and the basis for the official Spanish measurements contained in the *Anuario estadístico de España* for that year.
2. The map contained in Francisco Coello's *Reseñas geográfica, etc., de España*, published for the Statistical Commission of Spain, at Madrid, in 1859.
3. The Spanish Hydrographic Map, the date and title of which are unknown to me.
4. The map made by B. Domann, under direction of F. Blumentritt, and accompanying the latter's paper on the "Ethnography of the Philippines," 1882.

The measurements of area which have been made from the foregoing maps are as follows : —

1. The official Spanish figures dating back at least to the Spanish Statistical Year-Book for 1858 and found in that volume.
2. A measurement made from the map in Coello's *Atlas* by F. Jagor, the results of which are found in *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, viii, 1873, Heft 3.
3. A measurement made by the same man from the Spanish Hydrographic Map and published in the same place.

¹ The information contained in this memorandum has been derived mainly from the successive issues of *Die Bevölkerung der Erde* contained in the supplementary volumes of Petermann's *Mittheilungen*.—W. F. W.

[NOTE.—The main results of measurements 2 and 3 for the larger islands are found in F. Jagor, *Reisen in den Philippinen*, 1873, but not in the English translation.]

4. A measurement made in Perthes *Geographischer Anstalt* from the Blumentritt-Domann map.

An attempt to collate the results of these measurements for the larger islands follows :—

AREAS OF THE MAIN ISLANDS OF THE PHILIPPINES IN SQUARE MILES ACCORDING TO FOUR PRESUMABLY INDEPENDENT MEASUREMENTS.

Islands.	Official Spanish Figures.	Jagor's Measurements.		Perthes Measurements from the Domann Map.
		From Spanish Hydrographic Map.	From Map in Coello's Atlas.	
Luzon.....	42,840	41,100	41,125	40,990
Mindanao.....	32,720	34,500	33,380	37,190
Palawan.....	5,349	5,005	?	4,573
Samar.....	4,702	4,848	5,028	5,100
Panay.....	4,558	6,749	4,746	4,636
Mindoro.....	3,726	3,870	3,940	3,936
Leyte.....	3,669	3,473	3,591	3,717
Negros.....	3,362	4,844	3,478	4,673
Cebu.....	2,288	1,618	2,216	1,814
Entire group.....	114,130	114,650	113,550	114,300

In 1888 the Spanish official publication, *Reseña geog. y estad. de España* declared that the area of the islands was not even approximately known, and only for Luzon and the neighboring islands could it be given with confidence.

It is probable that the Blumentritt-Domann map is the most accurate of the four, and practically certain that the measurements made from it were more careful and accurate than those in the other three cases. Hence if any one of the foregoing must be used the last column is to be preferred.

The population of the islands in 1872 was stated in a letter to *Nature* (6: 162), from Manila, by Dr. A. B. Meyer, who gives "the latest not yet published statistics" as his authority. The letter gives the population of nine islands, as follows :—

Luzon	4,467,111	Negros	255,873
Panay	1,052,586	Samar	250,062
Cebu	427,356	Mindanao . . .	191,303
Leyte	285,496	Mindoro	70,926
Bohol	283,515		

It also gives the population of each of the 48 provinces of the islands. The population was not counted but estimated. The number who paid tribute was stated as 1,232,544. How this was ascertained we are not informed. The total population 7,451,352 was approximated "on the supposition that about the sixth part of the whole has to pay tribute." In reality this population is 6.046 times the assigned tribute paying population.

But Dr. Meyer adds: "As there exist in all the islands, even in Luzon, independent tribes and a large number in Mindanao, the number of 7,451,352 gives no correct idea of the real population of the Philippines. This is not known at all and will not be known for a long time to come."

Since 1872 there have been actual enumerations of the Philippines, but authorities differ as to the time when they occurred and the detailed results. These enumerations were usually confined to the subject and Catholic population and omitted the heathen, Mohammedan and independent tribes.

Four reports of the *entire* population have been printed:—

1. A report made by the religious orders in 1876 or 1877 in which the nationalities and creeds of the population were distinguished.

2. A manuscript report to Professor Blumentritt of the enumeration made by the religious orders in December, 1879.

3. The official report of the civil census of December 31, 1877, contained in *Reseña geog. y estad. de España*, 1888, p. 1079.

4. The official report upon the census taken by the civil officers December 31, 1887, and printed in the first volume of *Censo de la Poblacion de España*, at Madrid, in 1891.

The *first two* may be compared and tend somewhat to corroborate each other as follows:—

	1876-77.	1879.
1. Tribute-paying natives	5,501,356	
2. Army	14,645	
3. Navy	2,924	
4. Religious officers (Geistlichkeit)	1,963	
5. Civil officers	5,552	
6. Other Spaniards	13,265	
Total Spaniards	38,248	
Total Catholics	5,539,604	5,777,622
Heathen or Mohammedan natives .	602,563	632,845
Foreigners (in 1876 there were :		
British 176, German 109, Ameri-		
cans 42, French 30)	378	502
Chinese	30,797	30,064
Total	6,172,633	6,449,813

The *third* enumeration reported 5,567,685 as the tribute paying population. To this number should be added the estimated number of the independent tribes, "Indios no sometidos"; this according to the missionaries' count was about 600,000, making a total of 6,167,685. Most experts agree that this official report is untrustworthy and involves serious omissions, but believe that the facts are so imperfectly known that they are unable to correct it.

One author, del Pac, writing in 1882, started from the missionaries' census of 1876-77, *viz.*, 6,173,632, assumed that this omitted as many as 600,000 members of independent tribes and that the increase of 1876-82 would be 740,000. In this way he got 7,513,632. A second writer, Sanciano,¹ estimated the population in 1881 as 10,260,249.

The missionaries made an estimate of their own in 1885 which showed 9,529,841.

The *fourth* enumeration of those mentioned above showed a population of 5,985,123 in 1887, and the totals both for the group as a whole and for the fifty odd provinces tend to confirm and to be confirmed by the civil count of 1877. This number, however, represents only the nominally Catholic or tribute-paying population. To it must be added the Mohammedan or heathen tribes set down by clerical authorities as about 600,000. Perhaps the highest authority in this field, Professor Blumentritt, is confident that this number does not include all the independent tribes but only those in the mountains who have a special arrangement freeing them from all the dues of the subject tribes. On the whole, therefore, Professor H. Wagner is inclined to estimate these omissions of independent or non-Christian tribes at about 1,000,000 and the population of the group at about 7,000,000. This result is endorsed by the latest German authority, Hübner's *Geographisch-Statistische Tabellen* for 1898, which gives the population as $5,985,124 + 1,000,000 = 6,985,124$.

Personally I am disposed to suspect that this number, although called by Professor Wagner an outside estimate, is below rather than above the truth. In favor of this position it may be urged that Professor Wagner's estimate makes no allowance either for the natural increase of population, 1887-1898, or for the fact that the first careful census of densely populated regions, like India and Japan, usually reveals a

¹ Sanciano, *El Progreso de Filipinas*, Madrid, 1881.

larger population than had been previously estimated. This analogy might reasonably be applied to Luzon and the Visayas. Against my opinion it may be urged that the rebellion in the islands and the disorders attending it may have prevented any increase or even caused a decrease of the total population. How much weight should be given to this consideration I am unable to say.

Census Office, June, 1899.

W. F. WILCOX.

NOTES CONCERNING THE RATES OF INTEREST IN CALIFORNIA.

The layman might suppose that it is easy to ascertain the rates of interest on money lent which have prevailed at different times and in different places. Such a supposition would, however, be far from the truth. Every economist discovers, sooner or later, that among the data which he most frequently requires for use in his work few are harder to obtain than the average rates of interest. To be sure the daily papers and the financial journals give us the asking or published rates of interest in different cities for several different kinds of loans. But such statements do not prove of much use for scientific purposes. They are usually in a very general form, purporting to give the highest and the lowest rates; and they give us no clue to the amounts loaned at each of the different rates. Hence it is not possible to ascertain the averages. What we require for solving most economic problems which involve interest is not the asking rate but the average rate actually paid. This varies from the rates as usually quoted because the circumstances of many of the individual borrowers differ, for better or for worse, from those of the persons to whom money is offered at the quoted rates.

To illustrate the difficulties: I found, in the daily papers, that on a certain date the quotations for commercial loans in San Francisco were 7 to 8 per cent; but on inquiry I ascertained that such loans had been negotiated on the same day at rates ranging from $4\frac{1}{2}$ to $7\frac{1}{2}$ per cent, and the average for the day's business in five large banks was about $5\frac{1}{2}$ per cent. On the same day call loans secured by a deposit of bonds were quoted at 6 to 8 per cent, and the average rate was found to be 4.83 per cent, a very surprising discrepancy. Again

during a given six months the quoted rate on mortgages was invariably 6 to 8 per cent, the lender to pay the taxes; but during the same period mortgages on which the banks paid the taxes were made at rates ranging from $5\frac{1}{4}$ to $9\frac{1}{4}$ per cent, and the average was 7.35 per cent.

Certain difficulties arise even in what seems to be a very simple case. I suppose that almost any business man thinks he knows the rate of dividends paid by the savings banks. But if the matter be investigated it will be found that the rate varies, a little at least, from bank to bank, and that some of the banks have different classes of deposits upon which different rates are paid. The true average, therefore, will differ from the rate announced by any one bank.

There are many important problems in economics which require for their solution a knowledge of the average rates of interest prevailing at different times and places. Yet the necessary information is very hard to obtain. The tables in Professor Irving Fisher's "Appreciation and Interest" (*Publications of the American Economic Association*, Vol. xi, No. 4.) have proven so useful as to encourage the effort to obtain further details. In the course of an investigation into the effect of the taxation of mortgages on the rate of interest in California, I had an opportunity to obtain the rate of dividends paid by savings banks. The rates of interest on mortgages and on commercial loans in California will be found in the *Yale Review* for May, 1899. The tables there published with the one below contain practicably all the information obtainable concerning rates of interest in California.

The tables are for the most part self-explanatory. Yet a few facts concerning the history of California will, perhaps, help to explain the difference between these rates and those that have prevailed elsewhere. Railroad connection with the East was completed in 1869. Prior to that time California was isolated; was a "new country," and all the economic conditions were peculiar. Capital was comparatively scarce and opportunities for its investment were innumerable. Hence the rates of interest were abnormally high. The current rates in the "early days" were quoted at $1\frac{1}{2}$ to 2 per cent a month. As will be seen from the table the savings banks could pay $1\frac{1}{4}$ per cent a month dividends even ten years after the arrival of the "Argonauts." The thrifty Michael Reese is said to

have half repented of a generous gift to the University of California with the exclamation: "Ah, but I lose the interest," a very natural regret when interest was 24 per cent per annum.

AVERAGE RATES PER ANNUM OF THE SEMI-ANNUAL DIVIDENDS PAID BY SAN FRANCISCO SAVINGS BANKS.

For the Six Months Prior to First Day of :	Dividend.	For the Six Months Prior to First Day of :	Dividend.
January, 1880.....	15.00 per cent. *	July, 1880.....	5.78 per cent.
July, ".....	15.00 " " *	January, 1881.....	5.20 " "
January, 1881.....	12.00 " " *	July, ".....	4.95 " "
July, ".....	12.00 " " *	January, 1882.....	4.78 " "
January, 1882.....	12.00 " " *	July, ".....	4.14 " "
July, ".....	12.00 " " *	January, 1883.....	4.12 " "
January, 1883.....	10.75 " "	July, ".....	4.09 " "
July, ".....	10.95 " "	January, 1884.....	4.06 " "
January, 1884.....	10.87 " "	July, ".....	4.07 " "
July, ".....	10.98 " "	January, 1885.....	4.08 " "
January, 1885.....	11.64 " "	July, ".....	4.24 " "
July, ".....	12.86 " "	January, 1886.....	4.21 " "
January, 1886.....	13.09 " "	July, ".....	4.18 " "
July, ".....	11.15 " "	January, 1887.....	4.15 " "
January, 1887.....	11.05 " "	July, ".....	4.05 " "
July, ".....	11.08 " "	January, 1888.....	4.05 " "
January, 1888.....	10.87 " "	July, ".....	4.24 " "
July, ".....	10.51 " "	January, 1889.....	4.58 " "
January, 1889.....	10.63 " "	July, ".....	4.60 " "
July, ".....	10.63 " "	January, 1890.....	5.01 " "
January, 1890.....	11.27 " "	July, ".....	5.01 " "
July, ".....	11.32 " "	January, 1891.....	5.05 " "
January, 1891.....	10.49 " "	July, ".....	5.06 " "
July, ".....	10.42 " "	January, 1892.....	5.06 " "
January, 1892.....	9.45 " "	July, ".....	4.90 " "
July, ".....	9.15 " "	January, 1893.....	4.81 " "
January, 1893.....	9.14 " "	July, ".....	4.75 " "
July, ".....	9.08 " "	January, 1894.....	4.78 " "
January, 1894.....	8.60 " "	July, ".....	4.49 " "
July, ".....	8.55 " "	January, 1895.....	4.47 " "
January, 1895.....	8.60 " "	July, ".....	4.41 " "
July, ".....	8.65 " "	January, 1896.....	4.10 " "
January, 1896.....	8.70 " "	July, ".....	4.09 " "
July, ".....	8.70 " "	January, 1897.....	4.00 " "
January, 1897.....	8.69 " "	July, ".....	3.99 " "
July, ".....	8.42 " "	January, 1898.....	3.98 " "
January, 1898.....	7.95 " "	July, ".....	3.79 " "
July, ".....	7.75 " "	January, 1899.....	3.73 " "
January, 1899.....	7.02 " "	General average.....	7.45 " "
July, ".....	6.80 " "	Average since 1880.....	4.45 " "
January, 1880.....	6.55 " "	Average prior to 1880..	10.25 " "

* Prior to January, 1883, the dividend quoted is for one bank only.

The period from 1870 to 1880 was one of readjustment. The traditions of the "forty-niners" died away. But the readjustment did not take place without violent convulsions, both economic and political. Beginning in 1872 there was an era of speculative excitement connected with mining which has been likened to the Mississippi Scheme and the South Sea Bubble. This, known as the "Bonanza Mining Boom," seems to have involved the whole community not excepting the banks. The "boom burst" in 1875. From that time until 1880 the general trend of prices, wages, and interest was downward. This led to general unrest and political disturbance which culminated in the new constitution adopted in 1879.

Since 1880 the economic history of California, or at least of the city of San Francisco and vicinity, has not differed so very much from that of the rest of the country. In view of the facts just narrated it has been deemed advisable to divide the tables into two parts at the year 1880. General averages are given for the entire time covered, also for the years since and for those prior to 1880.

CARL C. PLEHN.

MARRIAGES OF THE DEAF.

Marriages of the Deaf in America. By Edward Allen Fay, Vice-President and Professor of Languages in Gallaudet College, Editor of the *American Annals of the Deaf*. Published by the Volta Bureau. Washington, D. C., 1898; pp. 527.

Dr. Fay has brought together in this work the results of the valuable statistics which he was authorized to collect for the United States Census of 1890 relative to the deaf in the United States. The work is largely statistical and has been very carefully prepared. The term "deaf" as used in this inquiry refers to the "totally deaf," "very deaf," or those who have attended schools for the deaf. The marriages considered extend over nearly the whole of the nineteenth century, and are 4471 in number. The tabulation of these comprises 360 pages, and contains the known and essential data relative to each marriage. From these the author has compiled 92 short tables, in order to answer as fully as possible the following questions:—

1. Are marriages of deaf persons more liable to result in deaf offspring than ordinary marriages?

2. Are marriages in which both partners are deaf more liable to result in deaf offspring than marriages in which one of the partners is deaf and the other is a hearing person?

3. Are certain classes of the deaf, however they may marry, more liable than others to have deaf children? If so, how are these classes respectively compared, and what are the conditions that increase or decrease this liability?

4. Aside from the question of the liability of the offspring to deafness, are marriages in which both partners are deaf more likely to result happily than marriages in which one partner is deaf and the other is a hearing person?

From the final summary and conclusions it appears that marriages of the deaf are more common in the United States than in Europe. The pupils of American schools for the deaf, who are recorded as married, constitute 23 per cent of the whole number of such pupils up to 1890, while in the countries of Europe, except Denmark, it varies from 12 to 7 per cent, a fact which the author attributes partly to the absence of marriage restrictions in America and to more prosperous circumstances.

Marriages of the deaf have rapidly increased in America in the present century; this being due largely to the establishment of schools for the deaf.

Deaf and Hearing Partners. A majority of the married deaf have married deaf rather than hearing partners; the proportion of such marriages in which both partners were deaf was 72.5 per cent.

Productiveness. Marriages of deaf persons, one or both of the partners being deaf, are probably somewhat but not much less productive than ordinary marriages. The average number of children of deaf persons to each mother who had children was 2.6.

Deaf Offspring; One or More Partners Deaf. Marriages of deaf persons, one or both partners being deaf, are far more liable to result in deaf offspring than ordinary marriages. The proportion of marriages of the deaf resulting in deaf offspring was 9.7 per cent, and the proportion of deaf children born therefrom was 8.6 per cent. The proportion of ordinary marriages resulting in deaf offspring is unknown (estimated by the author as less than $\frac{1}{10}$ of 1 per cent). On the other

hand, marriages of the deaf are far more likely to result in hearing offspring than in deaf offspring, the proportion of hearing children reported being at least 75 per cent. These results are in accordance, on the one hand, with the law of heredity that a physical anomaly or an unusual liability to certain diseases existing in the parent tends to be transmitted to the offspring; and, on the other hand, with the law of heredity that the offspring tend to revert to the normal type.

Both Partners Deaf or One Partner Hearing. It is not necessary for hereditary transmission that both partners should be deaf. On the contrary, taking the deaf as a whole, marriages in which both partners are deaf are not more liable to result in deaf offspring than those in which one partner is deaf and the other is a hearing person.

Partners Congenitally or Adventitiously Deaf. Congenitally deaf persons whether married to one another or to the adventitiously deaf are more liable to have deaf offspring than are the adventitiously deaf. This liability is greatest when both partners are congenitally deaf. Marriages of adventitiously deaf persons are more liable to result in deaf offspring than ordinary marriages. The greater liability to deaf offspring of marriages of the congenitally deaf than of the adventitiously deaf is in accordance with the generally accepted law of heredity that congenital or innate characteristics are far more likely to be transmitted to the offspring than acquired characteristics.

Partners Having Deaf Relatives. Deaf persons having deaf relatives, however they are married, and hearing persons having deaf relatives and married to deaf partners, are very liable to have deaf offspring. In marriages where both partners are congenitally deaf, and both have deaf relatives, the proportion of them having deaf offspring, and the proportion of deaf offspring born therefrom, are very high (28.4 and 30.3 per cent), but where neither of the partners has deaf relatives, even though both of them are congenitally deaf, the liability appears to be slight.

Partners Consanguineous. The marriages of the deaf most liable to result in deaf offspring are those in which the partners are related by consanguinity. Thirty-one such marriages were recorded, of which 14 or 45.1 per cent resulted in deaf offspring, and 100 children were born of these 31 marriages of which 30 per cent were deaf.

Happiness. Marriages in which both of the partners are deaf are more likely, other things being equal, to result happily than those in

which one of the partners is deaf and the other is a hearing person. The favorable conditions in such cases are the strong bond of mutual fellowship growing out of their similar condition, the ease and freedom of their communication with each other, and the identity of their social relations outside the domestic circle.

These highly valuable researches are due to the liberality of Dr. A. Graham Bell as the originator of the work, and the task has been completed in this very thorough and useful compilation by Dr. Fay.

S. W. A.

AMERICAN STATISTICAL ASSOCIATION.

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DEVELOPMENT OF THE PLAN FOR A CENSUS OF THE WORLD.*

BY JOHN HOWARD DYNES.

As the preparations for our next census in June, 1900, are arousing general interest, the time is fitting for an account of the project for a world census of which this might be a constituent part. But it may be asked what is meant by a world census; for taking a census is an administrative act, and there is no central administrative body with authority to act for all nations. Hence the meaning of the term "a census of the world" requires explanation and qualification.

Nearly all the value of statistics is derived from their use in comparisons. For example, we compare the number of people in a state or country at one date with the number at an earlier date, in order to ascertain whether the population is becoming more dense. Then, by comparison of the birth rates and death rates at the different dates, we get some indication of the cause of the increase, decrease, or stationary character of the population. But economic and sociological

* The information upon which this article is based has been derived mainly from a paper by Dr. Josef von Koroel in the last issue of the *Bulletin of the International Statistical Institute*, vol. xi, part 2, pp. 220-250. There will also be found in the *Publications of this Association* (No. 41, March, 1898) an article by the same writer on "Uniformity in Census Returns." This gives the substance of an address delivered by him at the St. Petersburg meeting of the International Institute.

studies must show relations in space as well as in time; and the investigator groups the figures at his disposal so as to show how one section of a country compares with another in regard to the subject of his inquiry. When the statistics for a whole country are gathered and compiled under the direction of a single authority in accordance with a definite plan there is no difficulty in making desired comparisons. But if the statistics to be used have been published by different countries it may or may not be possible to show the desired relations. When the same inquiries have been made with equal care, and the same methods adopted in presenting the results, comparison will be almost as easy as in the case of statistics emanating from a single bureau. But if the same subjects of inquiry have not been chosen, or if different methods have been used in presenting the returns, it will be impossible to use the figures to make the desired comparisons. For example, one cannot compare the number of native white population of native parents residing in Massachusetts in 1890 and in 1895. The Federal census gives the desired information for the former year, but for the latter the State census gives merely the classification of native born and foreign born without regard to parentage. In this case lack of comparability arises from the fact that the Federal and State authorities did not make the same inquiry.

But two census bureaus may put the same questions into the hands of their enumerators and may secure from them equally efficient service, and yet the published returns of their work may not be comparable.

Not only is it desirable to make comparisons in time and in space for a single country, but comparisons for different countries are essential for extended economic and sociological studies. Since the census bureaus of the various governments are independent, one need not be surprised to find that in some lines international comparisons are impossible because the statistics are incomparable. But it is a cause for

wonder that after the efforts of many years to correct this fault, the statistics of different countries still remain incomparable at so many points. This defect is met with even in some of the most fundamental statistical inquiries. Age statistics furnish a striking example. Many census publications contain tables showing the number of persons in each year of age. But in other cases the only age tables published merely group the numbers in periods of five or ten years. Since it is necessary to ascertain the age of each individual in order to publish any complete age tables, it does not appear why in all cases the figures should not be given year by year for the whole period of human life. This lack of detailed age tables for all countries in which censuses are taken is a bar to many interesting investigations. How shall one ascertain the number of men of military age in any country, when its census bureau publishes the ages of the people only in quinquennial or even in decennial groups? Yet the importance of this inquiry was pointed out by General Walker nearly thirty years ago. He wrote: "It is difficult to conceive of any species of information which can, from a practical point of view, have precedence in a census over the determination of the number of males between 18 and 45." *

Another example of lack of comparability is found in the statistics of marital condition. Most census bureaus publish the figures with the fourfold classification of married, single, widowed, and divorced. But in some census publications the numbers of the divorced are not given at all, while in one country they are included with the widowed.

The figures showing the country of birth and the allegiance of the foreign born population are also in many cases far from comparable. Several of the governments, indeed, publish figures showing the number of their population of each sex born in each of the foreign countries. In other cases

* Report of Superintendent of Census, *Ninth Census*, vol. 1, p. xxxviii.

the greatest variety is found. In several countries the enumerators do not question the foreign born in regard to the land of their nativity. In others the number of the inhabitants coming from each of the foreign countries is stated, but no division is made to show the proportion of the sexes. England publishes the list only of those born in the British possessions. In Hungary, Italy, and Holland the question of country of birth is asked, but the returns are not elaborated in the census publications.

To give one further illustration of the difficulties which the investigator meets by reason of dearth of uniform statistics, the following quotation is made from a paper by Dr. Ogle:—

I have been tempted to compare the English figures with those of foreign countries. I have, however, rigidly abstained from doing so. Those who have read the laborious treatise of Morselli on suicide, and have noted how heterogeneous in form and how unequal in numerical efficiency were the materials from different countries with which he was forced to be content, will, I think, agree with me that it is at present more essential that statisticians should look to the accuracy and sufficiency of the returns of their own several countries than that they should indulge in premature comparison.*

Such difficulties as these in the way of international statistical comparisons long since attracted the attention of statisticians and enlisted their efforts to secure comparable figures for all civilized countries. About the middle of this century the widespread interest in this question manifested itself in a striking manner in the assembling of an International Statistical Congress. The idea of such a gathering of statisticians came to a group of eminent men from different countries who attended the Industrial Exposition at London in 1851. The renowned Belgian statistician, Quetelet, was the guiding spirit in this movement; and he has told the source of the inspiration which came to him and the other members of the group. Referring to the lack of comparable statistics

* Quoted in the *Encyclopædia Britannica* article on "Suicide,"

which so vexed investigators, and calling attention to the fact that such figures are a vital necessity to statistical science, he says:—

These considerations so simple and so elementary were presented with a new force on the occasion of the great exposition at London, that universal bazaar to which all parts of the civilized world came to display their arts and industry. Before these collected treasures it was not only the confusion of languages which formed an obstacle to the exchange of ideas; it was above all the inability which one experienced of comparing so many things and of appreciating as a whole the riches of so many nations.*

This first International Statistical Congress met at Brussels in September, 1858. It was called together at the instance of the Belgian Central Statistical Commission, acting on the proposition of Quetelet and Visschers. A provisional program was mapped out, and three sections provided for, in order to facilitate the action of the assembly. It was evident that the promoters of the Congress did not purpose limiting its deliberations to a narrow field. The first section was asked to consider the organization of statistics; enumeration of population; registration of births, marriages, and deaths; real property, its divisions, and registration of surveys; as well as emigration and immigration. The second section was to consider agricultural censuses and industrial and commercial statistics. To the third section was assigned the consideration of economic budgets of the working classes; census of paupers; instruction and education; criminality and repression.

The membership of this Congress was about one hundred and fifty, representing twenty-six states. In his opening address, as president, Quetelet declared that the first efforts of such an assemblage must be to introduce unity into the official statistics of different countries, and to make their results comparable. For he maintained that without the

* *Compte Rendu des Travaux du Congrès Général de Statistique réuni à Bruxelles, 1858, p. 21.*

possibility of comparison, the science of observation was impossible.

In this spirit the Congress adopted resolutions declaring that the end proposed in their organization had been "more especially to seek to introduce unity into the official statistics which governments publish, and to render their results comparable." "The surest means for reaching the desired unity," they declared, "seem to be the creation for each state of a central commission or an analogous institution, composed of the representatives of the principal branches of public administration, to whom shall be joined certain men who by reason of their studies and special knowledge can throw light upon the practice and resolve the difficulties which pertain essentially to the science." They further advocated "the summing up of census returns in each country in accordance with uniform formulas, which shall render these returns comparable with one another."*

The interest and enthusiasm manifested at this first International Congress opened the way for subsequent meetings; and, indeed, there was need for them if the wide field of activity which had been chosen was to be covered, and if proposed reforms were to be carried out. Congresses were held in succession at Paris, Vienna, London, Berlin, Florence, The Hague, St. Petersburg, and Budapest, nine in all, including the initial one at Brussels. The sessions were held at first two, and later three years apart, the last in 1876. The numbers present at the various meetings ranged from about one hundred and fifty to seven hundred and fifty, and the members enrolled, but not present, from fifty to nearly three hundred.

In 1869 and 1872 it was decided to organize a Permanent Commission.

"Its duties were to publish the resolutions of the Congress; to secure information as to their effect; to promote the possibility of compari-

* *Ibid.*, pp. 143 and 145.

son in the publications of the various states; to prepare subjects for discussion, and request from the various states the statistical material necessary for their investigation; and, finally, to promote comprehensive international statistical investigations."* Professor Meitzen says that "further assemblies were frustrated by the endeavor to make the commission a permanent organ in the official statistics of the various states, and the failure to see that the practical statistics of any country could not be determined by such a Congress." He has, however, paid a high tribute to the effectiveness of the measures carried through at these international assemblies, declaring that "everything which has occurred for statistics since the beginning of the Congress has been essentially a consequence of its stimulating and invigorating influence."†

Another writer‡ sums up the beneficial results of the congresses in eleven paragraphs. Some of the more important ones may be mentioned here.

The meetings brought together the men most capable of representing official and scientific statistical work, and greatly favored the perfection and development of statistical service in all civilized countries. As a result of their work many states established central statistical commissions or other similar institutions, while in several countries bureaus of statistics were created anew, and their organization can be attributed indirectly to the influence of these meetings. To their agency also could be traced progress in census work, in the comparative exposition of the movement of population, modifications and improvements in the statistics of sanitary service, as well as in those of agriculture, industry, commerce, means of communication, banks, public credit, etc. The congresses were also instrumental in bringing about the reciprocal exchange of publications among the bureaus of statistics; and in addition they created an interesting and valuable statistical literature of their own. Among the subjects treated in these publications were the statistics of the

* Meitzen, *History, Theory, and Technique of Statistics*, Falkner's translation, p. 79.

† *Ibid.*, pp. 79, 86.

‡ Neumann Spallart in *Bulletin International Statistical Institute*, vol. 1, pp. 6-8.

condition and movement of population, statistics of great cities, as well as those of mines, merchant marine, banks, and civil justice.

But notwithstanding the congresses exercised such excellent influence along many lines, there were certain faults in their mode of organization or their proceedings which finally led to their abandonment. The writer from whose article a list of the good qualities of the congresses has just been cited, mentions also some of their defects.* In the first place he refers to the invasion of a non-professional or uninitiated element which had been welcomed at the beginning for the sake of extending the interest in statistics, but which soon became a "truly useless ballast," having been attracted by motives which had nothing in common with the serious idea of scientific and official statistics.

Another fault pointed out was the frequent change of men who made up the membership properly so called of the congresses and Permanent Commission. This change led to a number of useless discussions repeated again and again. It often happened that one congress continued work begun by a preceding one, but in a different spirit; and many matters were abandoned, while questions which had already been decided were taken up for discussion from the beginning. But perhaps the most serious fault sprang from the reports of a more or less official nature to the governments, emanating from the congresses, and bearing directly upon the organization of these assemblies. They hindered the free discussion of a number of propositions, while failing to take account of the fact that the resolutions of the congresses or of the permanent commission could in no wise impose obligations on governments. "Nothing was more contrary to the dignity of the congresses and the Permanent Commission than the idea of claiming, on the one hand, an official position without being able, on the other hand, to give a

**Ibid.*, p. 8.

practical value to their resolutions, and without having the power ever to carry them out."

Though these congresses had made an important advance in bringing about uniformity in census inquiries, they had failed in their main purpose, namely, to secure census publications by aid of which extended and accurate international comparisons might be made. In the words of Dr. Körösi they had secured the homogeneity of the raw material but not of the finished product of statistics.

A decade elapsed from the time of the meeting of the last congress at St. Petersburg before the creation of another distinctively statistical organization of international scope. During the intervening period the International Congress of Hygiene and Demography most nearly filled the place of an international statistical organization.

As early as 1882 Dr. Körösi brought to the attention of this body, at its meeting at Geneva, the subject of uniformity in methods of presenting the census figures of different countries. He offered for the consideration of the scientists in attendance at that meeting an international outline which he desired to have adopted in order to secure what he termed "a census of the world, a statistical description of all civilized humanity." To this end he included in it only the minimum number of inquiries the returns from which should be published in accordance with uniform methods in all countries. The outline embraced two parts or schemes. One covered the most important combinations, and it was hoped that so much at least would be adopted without alteration by census bureaus everywhere. The other included less important combinations, and its general adoption was considered of secondary importance. The International Congress of Hygiene and Demography recommended the use of this outline by all bureaus of statistics.

The jubilee meeting of the Statistical Society of London, in 1885, offered further opportunity for interesting the em-

inent statisticians from many countries, who were in attendance, in this important question of uniform methods of treating census returns. At this meeting also an impetus was given to the establishment of a new international statistical organization; and in 1886 the first meeting of the International Statistical Institute was held at Rome. On that occasion the resolutions of the International Congress of Hygiene and Demography, adopted at Geneva in 1882, were referred to a special committee, including many eminent specialists, with M. Troïnitsky, the distinguished Russian statistician, as chairman. Acting on the recommendations of this committee, the general assembly of the Institute unanimously agreed on the desirability and possibility of uniform methods of tabulating census returns, and urged the use of the more important part of the outline proposed by Dr. Körösi four years earlier. A few months later the International Congress of Hygiene and Demography at its sixth session endorsed the resolutions adopted by the Institute.

The project for securing comparable censuses thus received the sanction of both international societies, and there was no longer need to discuss the desirability of the plan. On the other hand, when the Institute met at Berne, in 1895, a further step was taken. M. Guillaume, Director of the Federal Bureau of Statistics of Switzerland, submitted a report in which he took up the question whether, as the end of the century drew near, the time was not ripe for coöperation among the nations in a movement for simultaneous censuses in 1900. He granted that the difficulties in the way of such an attempt were great, but nevertheless did not consider them insurmountable. He showed that some fifteen of the chief governments of the world already had in view enumerating their populations in 1900 or 1901, among them such important ones as the German Empire, Great Britain and Ireland, France, and the United States. Nine of the fifteen had fixed up on either the first or the thirty-first of

December as the census date, though Denmark was to begin the work in February, and the United States in June. Hence, if the effort was to be made to secure a census of every country on the same day or even in the same month, it would be necessary to secure an international agreement through a conference of representatives of the different states.

M. Guillaume further recommended that a certain number of questions, interesting in the same degree in all countries, should be chosen from the outline originated by Dr. Körösi. He also urged the necessity of using everywhere terms of precisely the same signification, in order to secure data exactly comparable. In furtherance of these plans and suggestions the Institute passed without dissent a resolution providing for a special committee which was to report at the next session. Upon them devolved the duty of proposing a convenient date for taking the census in the different countries; of determining upon and formulating questions of general interest to be adopted by all the census bureaus; of defining with precision the terms to be employed in the blanks furnished to the enumerators; and, lastly, of considering the best means of bringing about an understanding among the governments of the world with a view of attaining the desired end. The committee was to consist largely of members of the Institute, who were also in charge of bureaus of statistics in their respective countries.

At the most recent session of the Institute, held at St. Petersburg, in 1897, M. Guillaume reported the answers given by the members of this committee to the question of the feasibility of carrying out the scheme for a universal simultaneous census. While the replies received from the several directors of bureaus of statistics were for the most part favorable to the plan for a general census on or about the same date, it was evidently out of the question to get a complete international census in 1900. Great Britain and France were not ready to make the change of a few months

in the dates fixed for their censuses, which compliance with the plan would require. The governments of both Russia and Spain had provided for a census in that same year (1897); and of course it was not to be expected that they would undertake so great and expensive a work only three years later. But the following states showed an inclination to proceed to the work of taking a census toward the close of the year 1900, *viz.*, Austria, Belgium, Brazil, Denmark, Finland, Hungary, Japan, Norway, Portugal, Uruguay, and Sweden.

Thus while the statistician's ideal of a universal census on a given day is not to be realized at present, one must note a fact which Dr. Körösi himself pointed out, that too much importance should not be attached to the matter of precise simultaneous enumeration. In regard to the matters of age, marital condition, illiteracy, nationality, religion, occupation, etc., this is not absolutely necessary, though, of course, desirable. It was regarded as a matter for congratulation that in the greater part of Europe, in the United States, and even in a part of Asia, censuses were to be taken practically at the close of the century, at dates varying from one another not many months.

In several European countries December is regarded with favor as the month for the census. Certainly the last or the first day of the calendar year is in some respects a suitable date for this purpose. But it is entirely unlikely that our Congress could be induced to provide for a census in the winter. It will readily occur to the reader that over large portions of our vast territory the obstacles which the enumerators would be likely to meet by reason of bad weather would be well nigh insurmountable. Even the much earlier date fixed for our national elections is open to criticism on this score. How much greater then would be the objection to taking the census in the winter.

Frequent reference has been made to the international outline adopted by the Institute and recommended for use

with a view to securing uniform methods in making abstracts of census returns. In offering this scheme in 1882 Dr. Körösi had intentionally omitted one subject, the inclusion of which was necessary to completeness. For statistics of occupations he made no provision, because the difficulties in the way of an international agreement on this point seemed too great to be faced at that time. Credit is due chiefly to Dr. Jacques Bertillon, Chief of Labor Statistics for the City of Paris, for supplying the scheme for filling up this blank in the outline. At the session of the Institute at Paris, in 1889, he had proposed an international nomenclature for forty-eight occupations, and at the meeting at Vienna, in 1891, as the result of collaboration with M. Vanacque, he presented a new outline, classing occupations in ten (later in twelve) chief groups. The scheme was also proposed of offering for the use of statistical bureaus three nomenclatures, comprising respectively sixty-five, ninety-seven, and four hundred and sixty-five headings, the second and third being detailed elaborations of the first. By securing the adoption of one or another of these nomenclatures comparability of the returns for occupations would be had in greater or less detail.

The question of the proper method of treating statistics of occupations is one of the most difficult with which the statistician has to deal. The matter was regarded as so important and complicated that the Institute deemed it unwise to enter upon its discussion at that time, but instead referred the plan proposed to the bureaus of statistics for criticisms and suggestions.

As a result many interesting and valuable observations were made. Perhaps the most important suggestion was to the effect that the fundamental divisions made in the scheme proposed by M. Bertillon should be accepted, while all the sub-divisions should be abandoned. In their stead about fifty of the most important occupations should be chosen, and the figures for these should receive uniform treatment in all countries. It seemed better to secure precise results

to this extent rather than to risk overshooting the mark in the attempt to gain uniformity in a greater number of details. When the Institute met in Chicago, in 1893, this suggestion was adopted, and the importance of the fundamental divisions in the scheme offered by M. Bertillon was emphasized. It was resolved also "that the Institute attaches a great importance to having the census of occupations taken in all countries in accordance with comparable nomenclatures." At the session at Berne, in 1895, a list of forty-eight selected occupations was adopted, eighteen of which were to be regarded as very important, while the uniform treatment of the others was considered only as of secondary value. It was further recommended that the nomenclatures should be translated into several languages, and that a systematic index of occupations should give the meaning of each heading.

The gap which had destroyed the completeness of the international outline was thus filled by the insertion of the scheme which would make possible international comparisons of statistics of occupations. It was not surprising then that Dr. Körösi, after the earnest labors of so many years, became enthusiastic in the close of his report at the St. Petersburg meeting. In his view it was only necessary for the Institute to rally to the support of the propositions of M. Guillaume in order to bring about the mobilization of an army of nearly a million experienced enumerators who should secure material for a scientific description of a population numbering from eight to nine hundred millions, inhabiting a territory of more than twenty-seven million square miles! He pictured "this grand army of disciplined explorers in the field of demology, penetrating almost at the same moment, into the haunts of all civilized humanity, from the huts of the Eskimo to the tents of the Bedouins, from the wigwags of the Redskins to the bungaloes of the East Indies." And at last there was prospect that the various portions of this great mass of sociological material might be presented in accordance with a uniform method and thus attain a value which

had never before attached to international statistics. It needed but the favor of the savants upon whom rested the duty of directing this great operation, to substitute for national censuses an international census of the world, and to raise demography from the low level of heterogeneous and incomparable descriptions to the high plane of an international but homogeneous description of all civilized humanity.

In accordance with the resolutions recommended in the report of Dr. Körösi the Institute voted that the various statistical bureaus should be provided with the international outline and informed of the plans for securing an international census.

What shall be said in closing of the prospect for such a census at the end of our century? In the first place, we have seen that at present we may not hope for a census of the world taken on the same day or even in the same month. On the other hand, it has been pointed out that comparability of the returns for the different countries is the object most to be desired, simultaneous enumeration being much less important. Again it has been shown that while Russia and Spain (and doubtless some less important countries) will not take a census either in 1900 or 1901, yet many of the most powerful and wealthy nations will proceed to this important work in one or the other of those years.

Many of the men who are in charge of census bureaus in various parts of the world are also members of the International Statistical Institute. Furthermore, this project has been discussed and worked over with zeal for many years, and has met with comparatively little opposition. A complete world census in accordance with the ideal of Dr. Körösi does not seem to be a promise of the very near future. Still we may hope that within a few years much more will be accomplished in securing comparable international statistics than ever before. One may not close without paying a tribute to Doctors Körösi, Bertillon, and Guillaume for the zeal they have manifested in urging forward the movement for a census of the world.

MISCELLANY AND NOTICES.

MONTHLY BULLETIN OF THE STATISTICS DEPARTMENT
OF BOSTON.

The Statistics Department of the City of Boston publishes each month a series of tables giving statistics with regard to meteorological conditions; mortality and causes of death; number of burial permits issued, interments in cemeteries owned by the city, number of cremations; movement of population in city institutions; number of immigrants; number of fires and alarms; number of cattle inspected; number of houses ordered vacated or demolished; number of samples of milk, vinegar, butter and cheese inspected; number of volumes in the public library; number of arrests; number of pupils in the public schools; number of baths taken at the public bath houses; number of transfers of real estate and of mortgages; commercial statistics; flour supply statistics; number of visitors to the Fine Arts Museum, etc.

In addition to the regular tables there is published in almost every number of the Bulletin an appendix which is in the nature of a short special study on some subject of general interest.

BULLETIN No. 1-5, MAY, 1899.

Bulletin No. 1-5, May, 1899, contained as an appendix two articles: (1) "Traffic under drawless bridges," and (2) "Statistics relating to Massachusetts cities."

Traffic Under Drawless Bridges. This was a special study undertaken at the request of the Cambridge Bridge Commission, who were considering the advisability of building a new bridge across the Charles River without a draw. The results were presented to the Board of Engineers of the War Department appointed to consider the petition of the Commissioners for leave to construct a drawless bridge from Cambridge Street in Boston to Main Street in Cambridge. The investigation showed that large traffic is carried on water courses spanned by numerous drawless bridges. The data collected relates

to the cities of Berlin, London, and Paris. In Berlin, no bridge of any importance has been built with a draw during the last twenty years. In 1895 the water-borne freight in Berlin, all of which passes under drawless bridges, amounted to 5,604,000 tons, which is slightly more than the freight tonnage of the railways in the same year. For London it is estimated that about 600,000 tons of freight pass annually under drawless bridges. In Paris the traffic is even more considerable than in the case of Berlin. The Port of Paris, including the canals of Saint Martin, Saint Denis, and L'Oureq, is the most considerable in France as regards the tonnage of the traffic handled. In 1895 the tonnage of the port amounted to nearly 7,000,000 tons, and in 1896 to over 8,800,000 tons.

Statistics Relating to Massachusetts Cities. This table gives the population, assessed valuation, tax rate, and indebtedness of the thirty-two cities of Massachusetts. In view of the fact that the tax rate is limited by statute, it develops some interesting facts. In Boston the tax rate is limited by Stat. 1885, Chap. 178, to \$9.00 per \$1000 of the average assessed valuation for the preceding five years; to this the city is allowed to add \$425,000 for the expenses of the County of Suffolk (Stat. 1887, Chap. 281), and an amount sufficient to pay the State tax and the requirements for interest and Sinking Fund payments on the city and county debt. In the other cities the tax rate is limited to \$12.00 per \$1000 of the assessed valuation of the preceding year (Stat. 1885, Chap. 312; 1898, Chap. 445), to which they are allowed to add an amount sufficient to pay State and County taxes, and interest and Sinking Fund requirements. The City of Boston, in which municipal functions have been more fully developed than in other cities of the State, is forced to subsist on a tax rate (\$13.60) lower than that of any other city, and lower than the average tax rate in the State.

The debts of the cities are also limited by statute; in Boston to two per cent of the average valuation of the five years next preceding (Stat. 1885, Chap. 178); in the other cities to two and a half per cent of the average assessed valuation for the preceding three years. The table does not give the data necessary to show the standing of each city with regard to the legal requirements as to debt. The large percentages of net debt to valuation do indicate, however, that most of the cities have debt authorized by special act of the Legisla-

ture which is not taken into account in computing the legal limit of indebtedness. The frequency with which cities apply to the Legislature for leave to issue bonds outside the debt limit has brought about the curious anomaly that in many cases the debt outside the limit exceeds that within the limit. On January 3, 1898, the gross debt of the City of Boston and the County of Suffolk was \$79,696,166.41, of which \$47,472,273.98 was outside the limit. On February 1, 1898, the total debt, funded and unfunded, of the City of Medford, was \$1,566,629 of which \$1,121,000 was outside the limit.

A comparison of the cities with the rest of the State shows that the cities, containing 65 per cent of the total population, possess 75 per cent of the total assessed valuation. The average tax rate in the cities is \$17.22; in the State, \$15.30. The cities bear 87 per cent of the gross and 84 per cent of the net debt. The per cent of net debt to valuation is, for the cities, 4.91; for the State, 4.39. The net debt per capita for the cities is \$57.28; for the State, \$45.44.

BULLETIN No. 6, JUNE, 1899.

The Debt of Boston, 1878-1898. A series of six tables treats of the funded debt of the City of Boston from 1878 to 1898. The first of these tables show the total indebtedness of the City of Boston and the County of Suffolk; the next four analyze this debt in detail under the heads of City Debt, County Debt, Cochituate Water Debt, and Mystic Water Debt, respectively; the sixth table shows the date of maturity of each class of the debt outstanding January 31, 1899. The tables giving the debt by years show three classes of facts. First, the annual charge necessary to carry the debt, showing separately the amount paid year by year to the sinking funds, and the annual payments of interest. Second, the yearly movement of the debt, showing the amount of debt created, amount of debt paid and the resultant net increase or decrease. Third, the status of the debt at the end of each fiscal year, showing the gross funded debt outstanding, the total resources of the sinking funds, and the gross debt less the sinking funds. This latter is designedly not called the net debt, because the City Auditor, in determining what he terms the net debt, deducts from the gross debt not only the sinking funds, but also the credit balance of the betterment account (representing special assessments ultimately due to the sinking funds but not yet

collected), and amounts held to meet debt matured but not presented for payment.

The main results for twenty years may be stated as follows:—

Period.	GROSS DEBT.		NET DEBT.	
	Absolute Increase.	Average Annual Increase.	Absolute Increase.	Average Annual Increase.
1879-80 to 1883-84 ..	\$917,853	\$183,570	\$235,017	\$47,003
1884-85 to 1888-89 ..	6,642,806	1,328,561	1,299,030	259,806
1890-90 to 1893-94 ..	4,468,060	\$69,612	5,836,410	1,167,282
1894-95 to 1898-99 ..	26,520,285	5,704,057	21,490,784	4,298,157
1879-1899.....	\$40,579,004	\$2,028,950	\$28,861,341	\$1,443,062

BULLETIN No. 7, JULY, 1899.

Valuation Statistics, 1898. The number of square feet of land taxed, the assessed valuation of this land and the assessed valuation per square foot are given for each ward and for the city. The analysis goes so far as to give the amount, valuation, and valuation per square foot of the occupied land as opposed to vacant land and the vacant land under the two headings of vacant upland and marsh and flats. The average assessed valuation of all the land taxed is a little over \$0.62 per square foot, varying from \$0.05 per square foot in Ward 23 (West Roxbury) to \$16.46 in Ward 7 (the business centre). The average assessed valuation of the occupied land is \$1.48 per square foot, varying from \$0.13 in Ward 23 to \$17.35 in Ward 7. The average assessed valuation of the vacant land is for vacant upland, \$0.14, varying from \$0.03 to \$12.22; for marsh and flats, \$0.05, varying from \$0.005 to \$0.98. Of the total amount of land taxed 64 per cent is classed as vacant land and only 36 per cent as occupied land. The number of buildings taxed is given by the wards under the head of hotels, family hotels, ordinary dwellings, stores, and miscellaneous buildings; the number and value of the vacant dwellings and of houses in process of construction follow. In Bulletin No. 8 an additional table gives by wards the number of buildings taxed, the total valuation and the average assessed valuation of the buildings.

BULLETIN No. 8, AUGUST, 1899.

Real Estate Exempted from Taxation. In Bulletin No. 7 a table was published, showing by wards the assessed valuation of land and buildings exempted from taxation, the number of square feet exempted, and the average assessed valuation per square foot of land. The Bulletin No. 8 contains an analysis of the exempt property giving the same facts by wards for the property of (1) the United States of America; (2) the Commonwealth of Massachusetts; (3) the City of Boston; (4) of churches; (5) of charitable, benevolent, literary, and scientific institutions; and (6) miscellaneous property. Another series of tables analyses by wards the property of the City of Boston, under the heads of cemeteries, city buildings, county buildings, ferries, Fire Department buildings, Police Department buildings, parks and public grounds, public institutions, schools, Water Department property, and miscellaneous land and buildings. The total amount of real estate exempt from taxation amounts to \$164,126,900, or over 15 per cent of the real estate assessed by the assessors; the exempt real estate of the City of Boston alone amounts to over 9 per cent of the total assessment. Of the total amount of exempt real estate 57 per cent is the property of the City of Boston; 13 per cent, property of the United States; 12 per cent, property of charitable, benevolent, scientific, and literary institutions; 10 per cent, property of churches; and 7 per cent the property of the Commonwealth of Massachusetts.

BULLETIN No. 9, SEPTEMBER, 1899.

Fire and Police Statistics of Principal American Cities. This appendix consists of a short abstract from an article published in the Bulletin of the Department of Labor, No. 24, Washington, D. C., September, 1899. It presents in tabular form the leading facts with regard to the fire and police protection of the ten largest cities in the United States. The facts presented are: for the Fire Department, the cost of maintenance, number of firemen, apparatus, hydrants, number of fires and alarms, and the property loss; for the Police Department, the cost of maintenance, the number of policemen, total number of arrests, and number of arrests for five principal causes.

H. H. COOK.

TRADE OF UNITED STATES.

The History of Trade between the United Kingdom and the United States. By Sydney J. Chapman. London. Swan, Sonnenschein & Co. 1899.

Mr. Chapman's book may be accepted as a sketch of the course of trade between the United Kingdom and the United States, but it suffers from the defects of being a sketch. Not only is the story told jerkily, but many essential factors are not mentioned, and undue stress is laid upon secondary conditions. It is dangerous to undertake to isolate our commerce with any one country, as the increasing solidarity of the world's markets renders such an attempt misleading. True, England has been our best customer; but even English trade has been modified by the West Indian trade and by the rise of a colonial empire, neither of which facts is referred to by Mr. Chapman.

The sins of omission increase in number and importance as he approaches recent times, for this interconnection of events and policies becomes more marked. Depending upon Professor Taussig's work Mr. Chapman is able to tell briefly the general course of tariff legislation; and in Mr. Wells' "Recent Economic Changes" he has at hand a perfect arsenal of fact and illustration. So long as he follows so good authorities he is safe, but his combinations are not very happy. For example, he has some appreciation of the importance of raw wools in determining the tariff on woollens since 1867. He does not seem to know of the commercial tables in the official reports giving the variations in the imports of each class of woollen manufactures, and says, on p. 80, that "The tariff is so detailed that it cannot be expected that trade statistics should follow its divisions." In fact the "imports for consumption" tables are closely framed on tariff details. Had Mr. Chapman studied these tables, he would have given a better explanation of the increased import of manufactures of wool after 1878.

The rise of industries in the United States is only incidentally referred to in connection with tariff policy, so the increased export of manufactures is not even mentioned. The reader would infer that the specific sketch of the tin-plate duties and their effects was intended to show that only through the intervention of Congress had the decreased dependence upon the foreigner been made possible. That

the combination of capitals, and the great saving in cost of production with new and labor-saving processes had any influence, is not to be inferred from this book. It would be a simple matter to multiply instances where the author has failed to grasp the importance of economic fact or tendency, and where he has exaggerated the effect of what was accidental and temporary. The general unsatisfactory manner of treatment becomes evident when Mr. Chapman's chapters are compared with Noyes's "Thirty Years of American Finance," a book that is a model of its kind. The opening chapter of Mr. Chapman's essay, treating of the "quantitative analysis of Anglo-American trade," is ineffective and misleading. We cannot accept his estimates of payment for freight, and the attempt to measure the other "silent" means of settling trade balances leads us to no conclusion. While the book may be useful to the beginner, it is too incomplete to instruct those who have used commercial statistics.

WORTHINGTON C. FORD.

NATALITY.

Sur les variations du taux de natalité et sur l'âge moyen des époux, suivant les conditions économiques. By Eurico Raseri. *Bulletin de l'Institut International de Statistique.* Vol. xi; 149.

The author attempts, with considerable success, to show that the commonly accepted theories as to the decrease of fecundity among the European nations are based on an erroneous use of statistics. The ratio of births to the total population shows, indeed, a marked diminution during the past twenty-five years, as is indicated in the following table:—

BIRTHS PER 1000 INHABITANTS.

	1870-74.	1890-94.
England ..	35.3	30.3
Austria ..	39.4	37.3
Russia in Europe ..	49.9	48.5
Switzerland ..	30.1	27.5
France ..	(1865-69) 25.9	22.4
Prussia ..	(1865-69) 37.6	36.9
Italy ..	36.3	(1891-95) 36.3

With a rapid increase in population, and a steady tide of emigration, the change in the age distribution of the population makes such a basis of calculation defective. If the number of births be referred to the number of females between the ages of 15 and 50, the result is changed as follows:—

	Year.	Ratio of Births to 1,000 Females Between 15 and 50.
ITALY	1863	149
	1871	145
	1881	146
	1891	149
FRANCE	1866	102
	1890	88
ENGLAND	1871	139
	1891	118
PRUSSIA	1867	138
	1890	148
AUSTRIA	1869	144
	1890	146
SWITZERLAND	1870	114
	1890	116

It appears from these figures that a decreased birth rate, with reference to women of marriageable age, has obtained in France and England only.

Rasari then proceeds to a calculation of the mean fecundity of marriages by dividing the number of legitimate births by the number of marriages. His results are again encouraging, except in the case France, as is shown by the following table:—

FECUNDITY OF MARRIAGES.

	1870-74.	1890-94.
Italy	4.5	(1891-95.) 4.4
France	(1865-69.) 3.0	2.1
Prussia	(1865-69.) 4.0	4.2
England	3.9	3.8
Austria	3.7	4.1
Russia in Europe	4.9	5.5
Switzerland	3.9	4.3

Finally, the author turns his attention to the theory that the average age of marriage is delayed by modern social conditions. He takes the average age of married men as a basis for calculation; and shows that it did not change appreciably, in the countries studied, between the early seventies and the early nineties. The concluding tables of average ages of married persons, and of average numbers of first marriages, in various occupations, are of less general interest. The author's final summary of this part of the paper is as follows:—

“The average age of married men has remained unchanged during the entire period of observation; it varies, only, to some extent, with the occupation. This variation concerns the age of the husband more than that of the wife; and it is not great enough to affect considerably the fecundity of the couples, even when the age of the husband is four or five years greater than the average for all occupations. In the various occupations the proportion of re-marriages bears no relation to the average age at the first marriage.”

La natalité selon le degré d'aisance. By Jacques Bertillon. *Bulletin de l'Institut International de Statistique.* Vol. xi; 163.

Bertillon studies in this paper the relation of the birth rate to the prosperity of the citizens in the various districts and sub-divisions of London, Paris, Berlin, and Vienna. He classifies each district as either very poor, poor, comfortable, very comfortable, rich, or exceptionally rich, by applying certain arbitrary statistical standards. In Paris, for instance, five factors are used in this classification,—the proportion of female servants to households of two persons or more, the proportion of formal contracts to total marriages, the proportion of persons having any occupation who are registered as artisans, the proportion of persons living in over crowded tenements, and the proportion of the population receiving public aid. In the cases of Berlin and Vienna similar data are used relating to rents, population per room, over crowding, and numbers of domestics. For London a classification drawn up by Charles Booth in 1893 is used without alteration.

The figures for each district separately are given by Bertillon, and the districts of each group are then averaged. His final results may be grouped in the following table:—

NUMBER OF BIRTHS PER ANNUM FOR EVERY THOUSAND FEMALES BETWEEN
15 AND 50.

City.	Very Poor Districts.	Poor Districts.	Comfortable Districts.	Very Comfortable Districts.	Rich Districts.	Very Rich Districts.
Paris. (1880-96).....	106	95	72	65	53	34
Paris. (1880-96. Month of April).....	107	92	69	63	50	33
Berlin. (1886-94).....	157	129	114	96	83	47
Vienna. (1890-94).....	200	164	155	153	107	71
London. (1881-90).....	147	140	107	107	87	63

The Paris rates were calculated on the births in April alone to exclude any error introduced by the annual migration from the richer districts. The check between these figures and those for the whole year is noteworthy.

Such a classification as that upon which these calculations are based is open to the objection that the population studied may differ in other respects than their prosperity. For instance, the very fact that the richest districts are defined as the ones having the greatest number of persons engaged in domestic service, implies a large proportion of unmarried persons, and, therefore, a lower birth rate than the normal. Nevertheless the figures are so harmonious, and the differences between the classes of districts is so great, that Bertillon may be said to have added a strong piece of evidence to the theory of the inverse ratio of birth rates and prosperity.

C.-E. A. WINSLOW.

STATISTICS OF IMMIGRATION.

Beginning with July 1, 1898, a new system of collecting and tabulating statistics of immigration to the United States was put into operation by the Immigration Bureau of the Treasury Department. The results of the new system during the first year of its existence have recently been published in the report of the Commissioner-General for the fiscal year 1899.

The principal feature of the new system is that each immigrant is tabulated as to nativity by race instead of by the country of his

later residence or political allegiance. The circular of instructions issued to the commissioners at the various ports says of this change: "This is not intended to be an ethnological classification. It is not intended as a history of the immigrant's antecedents but as a clue to what will be his immediate future after he has landed. It is merely a grouping together, as far as it seems practicable to do so, of people who maintain recognized communities in the various parts of this country where they settle, who have the same attitudes or industrial capacities or who are found here identified with certain occupations."

Whenever an immigrant does not clearly belong to a specially designated "race" he is to be classed with those of the same language or religion. The "mother tongue" or "dialect" is the language, dialect or form of speech which the immigrant first learned from his parents as a child in his own home.

Another new feature is a table of immigrants by religions. The only forms of faith tabulated are Brahmin and Buddhist, Greek Catholic, Roman Catholic, Israelite, Mohammedan, and miscellaneous. The heading "miscellaneous," according to the above mentioned circular of instructions, is intended to cover any form of religion not enumerated elsewhere, and also all cases where it is "impossible or inexpedient to obtain this information." I am informed that "inexpedient" refers to cases where immigrants are unwilling to answer questions in regard to their religion. Inspectors are instructed not to press the matter under such circumstances.

Another column has been added to the manifest, viz., "color." It does not appear in the *Report of the Commissioner-General*, except that "African" now comprises black Africans. The classification by color is designed to secure racial distinctions which would otherwise not be apparent, and has special reference to the negro races. All aliens clearly of negro blood are to be registered as black. I understand the classification is not carried in practice beyond this point, but, if in any cases of persons other than negroes it is desirable to give the color, the usual division into five colors is to be followed.

It is to be observed that while nearly all immigration statistics have a large factor of possible error (owing to being based on the statements of the immigrants themselves), yet the new classification is much more valuable for many purposes than the old. For example, although Russian Jews and German Jews differ from each other they

differ still more from the Russians and the Germans, and for the first time it is possible to tell the total Hebrew immigration. Again, while the average illiteracy of Austro-Hungarians last year was 25.2 per cent, the Bohemians show only 3.3 per cent; and while the average illiteracy of all Italians was over 53 per cent we find that of Northern Italians (*i. e.*, those from Tuscany, Emilia, Liguria, Venjce, Lombardy, Piedmont, and natives resident in other countries) to be only 11.4 per cent.

Again the new classification is important in connection with destination of immigrants in this country and their occupation.

The old classification by political states is given also in this year's report for purposes of comparison. It should be retained in the future, because questions may come up under treaties or in other legal and political relations which would be much illumined by the political grouping. The *Report of the Commissioner-General* shows also the relation between the old classification and the new by means of a table giving the numbers of the several races coming from the various political divisions. In so far as immigrants may be trusted to give their race correctly this table throws light on the emmigration of citizens of one country through the ports of another country after a temporary residence in the latter. Of course such a table does not give accurate results as to Canada. Practically all the immigration from British North America, as given in the table, is of British races with the exception of 522 Japanese.

PRESCOTT F. HALL.

PAUPER FAMILY HISTORIES.

The *Second Annual Report of the Pauper Institutions Trustees of the City of Boston for the year ending Jan. 31, 1899*, contains (pages 21-23) genealogical tables of six pauper families of Boston. The first table is the "Family History of A. B. C. and Half-Sister D. E." carried into three generations. A. B. C.'s father, and a step-mother, and his mother, with a step-father, all were under care of the Overseers of the Poor. Three of the four had been in the almshouse, and two died there. One of these had been in a reformatory. Of the eight children, only three lived long enough to be included in this table. These have been intemperate, receiving aid from the Overseers. A. B. C. and D. E. are the only ones now living; they

are registered criminals, and D. E. is notably immoral. D. E.'s children are all dead. The only child of A. B. C. was buried by the city. Of the five offspring of the third, one is dead, two are under the care of charity, and two are believed to be self-supporting.

Another table is a double-family group from the old "Crystal Palace" of Lincoln Street. Four generations are given. The two in the first generation were under care of the Overseers, and had two children. The first, who was immoral, married the son of an intemperate; and of her three sons, one died at the age of twelve, of heart disease. The second had two children. One of them has chronic lung trouble and is distinctly immoral, having two illegitimate children, supported by the city. The other was a criminal, was helped by the Overseers, etc., and died in the almshouse. He left five children; two died young; and two have been in care of public charity.

The third table shows an intermarriage of three families, to three generations. Of the three couples in the first generation, one was marked by poverty and intemperance. The better traits of the others, however, were not shown in their children. Of the seven members of the second generation, five have been in almshouses, four are diseased, four immoral, two intemperate, and one a criminal. The marriage of two of them gave two children, who died most immediately of "specific disease." Of the woman, an illegitimate child is now in a Home for adoption.

In the tables, the appearance or increase of crime, immorality, and disease in the offspring should be noted, and also the tendency of the offspring to grow relatively less, while a large per cent end in early death. It is a striking fact that, discarding the youngest generations, the twenty-seven people who applied for assistance made over one hundred applications and at so many different places that the sum of the total entries would represent their number as forty instead of twenty-seven, or in other words, would overstate the true total by fifty per cent.

E. H. D.

DANISH STATISTICS.

The *Nationalökonomisk Tidskrift* (9de-10de Hefte, 1899) praises the efforts and success of the Danes in the gathering and collating of statistics, commending especially the *Statistical Year-Book* as a

model of its kind. From this volume certain figures are quoted concerning Danish industries.

Industries were found to be 77,256 in number, employing in all 270,600 persons; 7139 establishments were supplied with mechanical motive power, and 4000 used other motive force than water or wind. The combined horse-power of machines was 52,212.

Industries are located chiefly in rural districts: $\frac{3}{4}$ of the establishments, employing $\frac{3}{4}$ of the force of workmen, and including $\frac{1}{10}$ of the plants using mechanical motive power and $\frac{3}{4}$ of those employing modern machinery, are found in the country. Relatively to population, however, the industrial development of the country falls behind that of the towns.

Small industries far exceed large in number, but the large employ over twice as many laborers. Only 425 industries employ over 50 hands, but these 425 give work to not less than 30 per cent of the whole number of laborers. The clothing industries number 23,557, employing 303 horse-power, while the paper industries number 82, with a horse-power of 1690. Industries producing articles of food, etc., are rated at 19,000 horse-power.

The number of male laborers is to that of female about as 4 is to 1; probably the proportion should be somewhat less. Women are employed chiefly in towns, Copenhagen standing first in this respect. The number of women is relatively greatest in the clothing and paper industries, though the food industries, where the proportion of men to women is 76 to 24, employ 7400 women; these 3 industries employ 29,000, or 80 per cent of the female labor.

In the industries, apart from errand-service, etc., 4672 children between the ages of 10 and 14 are employed, so that the proportion of children to laborers of both sexes is 27 per thousand; this figure increases in the smaller cities to 40 per thousand. The tobacco and cigar industry employs the greatest amount of child labor; 1942 children, of whom 186 are girls, labor in this industry, under conditions somewhat suspicious as respects health and morals. Here also 588 males and 180 females between the ages of 14 and 18 work side by side. Children are employed chiefly in the larger establishments.

Of workmen over 22 years of age, 39.5 per cent are married. Home labor is a common thing among workmen's families.

A. G. KELLER.

Yale University.

STUDY OF CHARITY STATISTICS.

The *Labor Bulletin of Massachusetts* (October, 1899. No. 12) contains a very valuable "Study of Charity Statistics" (pp. 119-155). The statistics are derived from the records of 2636 families within the districts covered by the friendly visitors of the Associated Charities of Boston. These families are separated into two classes, namely, 1000 visited for two years or more, and 1636 which were new to the district visitors during the year ending May 31, 1899. The latter group is also subdivided into two sections, one made up of families absolutely not known to have received charity before June 1, 1898, and the other, of families who have at some time prior to the year been known to charity, though new to the district workers who collected the statistical data. The analysis considers the conjugal condition of families, ages, number of room occupied, illiteracy, nativity of heads of families, causes of distress, decisions as to relief, the aged poor, married couples, widows and women divorced, deserted wives, and widowers. Of chief interest is the table dealing with the causes of distress. On this point the statistics may be summarized as follows:—

Classification of Causes of Distress.	1,000 Families Not New This Year.	742 Known to Charity Before June 1, 1898.	875 Not Known to Any Charity Before June 1, 1898.
	Percentages.	Percentages.	Percentages.
Within the family.....	89.00	90.14	86.74
Disregard of family ties.....	5.70	7.26	7.77
Intemperance.....	29.30	27.53	15.43
Licentiousness.....	3.30	3.84	6.26
Dishonesty, or other moral defects...	2.20	2.74	5.26
Lack of thrift, industry, or judgment	10.80	19.04	16.34
Physical or mental defects.....	4.40	4.11	4.80
Sickness, accident, or death.....	33.30	25.62	30.86
Outside the family.....	9.60	9.18	12.60
Lack of employment, not employé....	9.00	7.67	10.74
Defective sanitation.....	....	0.13	0.12
Degrading surroundings.....	0.10	0.28	....
Unwise philanthropy.....	0.10	0.28	0.23
Public calamity.....	0.10	....	0.12
Persecution in own country.....	0.30	0.41	0.23
Volunteer service in U. S. Army....	....	0.41	1.25
Lack of training for work.....	1.40	0.68	0.57

MASSACHUSETTS LIFE TABLE.

The *Thirtieth Annual Report of the Board of Health for Massachusetts* for 1898 contains a valuable paper entitled "Vital Statistics of Massachusetts for 1897 with a life table based upon the census of the five-year period 1893-97" prepared by Dr. S. W. Abbott. The materials used as the basis of the life table are the census of 1895 and the deaths, numbering 240,215, which were registered in the State in the five years 1893-97. The middle year of this period, 1895, was a census year, and the census was taken very near the middle of that year. The limitations which affect the accuracy of a life table for Massachusetts are stated to be as follows:—

1. The effect of migration;
2. Defects of the census;
3. The practice of incorrectly reporting the ages of the living and the dead.
4. Defects in birth and death registration.

The figures for the first five years of life have been compiled from the births and from the deaths which occurred among children under five years of age. One hundred thousand was taken as the basis of the table, since this is the largest round number near the exact number of annual births in the State.

The sexes at the time of birth are unequally distributed, the males being in the ratio of 51,350 and the females 48,650 out of each 100,000 born during the period selected for the construction of the table. These numbers are therefore taken as the number at birth of the two sexes out of the hypothetical 100,000 born. It appears that out of 100,000 children born alive in Massachusetts in 1895, 16,000 died before arriving at the age of one year; 78,963 attained the age of three years; 77,051 survived the age of five years; 50,126, or a little more than one-half, attained the age of fifty-three years; 25,406, or a little more than one-quarter, lived to the age of seventy-two years.

"These figures present very decided differences as compared with those which were published for 1855 by Mr. E. B. Elliott (*Sixteenth Massachusetts Registration Report*, 1857). In those reports it was shown that the numbers dying before the close of the first year out

of 100,000 born were 15,510, or very nearly the same as those for the year 1895 for the same age. At the end of three years the survivors were only 74 per cent, instead of 79 per cent, as in 1895, and that one-half had died before the close of the forty-first year, instead of surviving to the fifty-third, as in 1895."

NOTES ON VITAL STATISTICS.

The *Annual Report of the Secretary of War* for the year 1899 contains the following table of deaths from yellow fever in the city of Havana for the first ten months of the year (p. 17):—

1890	314	1895	512
1891	318	1896	950
1892	272	1897	991
1893	469	1898	134
1894	369	1899	63

This is a striking tribute to American sanitation, the number of deaths being less than one-seventh of the average number for the nine years preceding. The improvement is, however, evidently not due to this cause alone. The decrease in deaths for 1898 must in part have antedated American influences, and may in part be accounted for by the great number of deaths in 1896 and 1897, a period of abnormally high death rate from any zymotic disease, being often followed by a fall below the normal.

The report of the Secretary of War contains another table which illustrates a certain aphorism as to figures and their deceptiveness. On p. 25, he says, "The significance of the annual death rate from disease in the Philippines (17.20 per thousand) may be better appreciated by comparison with the rates in some of our well-known American cities."

The annual death rate per 1000 is:—

Washington	20.74
Boston	20.09
San Francisco	19.41
New York	19.28
Baltimore	19.10
Soldiers in the Philippines	17.20

It must be obvious to the most casual observer that the death rate of a large city, including the entire population,—infants and old

people,—is scarcely comparable with the mortality of a body of men between the ages of eighteen and forty-five who have been subjected to a rigid physical examination. The effect of the medical selection can be only surmised; it must at any rate be great. The effect of the simple age limitation is shown by the following figures:—

In Boston, in 1890, the total death rate was 24.79; between the ages of 15 and 20 years it was 7.81; between the ages of 20 and 25 years it was 9.92; between the ages of 25 and 35 it was 12.49; between the ages of 35 and 45 it was 16.89 (*Vital Statistics of Boston and Philadelphia*. Census Office. 1895). In New York, in 1890, with a total death rate of 28.63, according to the same authorities, the death rate for the four age-periods given above were 5.76, 9.96, 14.26, and 21.01, respectively.

Les naissances et les décès suivant les heures de la journée. By Enrico Raseri. *Bulletin de l'Institut International de Statistique*. Vol. xi; 144.

The author refers to the figures given by Casper (*Denkw. sur mediz. Statist.* Berlin. 1846), and by Haushofer (*Lehr und Handbuch der Statistik*. Vienna. 1872), and then submits certain statistics collected by himself on the hourly fluctuations in the number of births and deaths. His table includes 25,474 deaths recorded by the chief of the local bureau of statistics in the city of Crémone, and 36,515 births in the city of Rome, during 1894, 1895, and 1896, in which the hour of birth was stated. The figures are reduced to a basis of one thousand deaths (or births) per twenty-four hours and plotted on a curve. The results confirm those of Casper, showing the deaths to be most numerous from 2 to 5 P. M. The average hourly deaths for every 1000 deaths per twenty-four hours were 49 between 2 and 7 P. M.; and only 34 between 7 P. M. and midnight. The birth curve shows an inverse ratio, its maximum occurring from 2 to 8 A. M. The average hourly births for every 1000 births per twenty-four hours were 52 between 1 A. M. and 8 A. M.; and only 33 between 1 P. M. and 8 P. M. The base of calculation is not sufficient to give smooth curves; nevertheless the main variations are clearly shown. The author's attempts to explain the phenomena on physiological grounds are not convincing.

C.-E. A. WINSLOW.

STATE PUBLICATIONS.

State Publications: a Provisional List of the Official Publications of the Several States of the United States from their Organization. Compiled under the editorial direction of R. R. Bowker. Part I: New England States. New York. Office of the Publishers' Weekly. 1899. Pp. 99.

This work had its origin in the desire to make the wealth of information in government documents more available for the use of students than it is at the present time. The editor, Mr. Bowker, is undertaking it as a work of love. Certainly the student body of this country are under great obligations and should be prompt in rendering their acknowledgments. In this publication the States are arranged geographically rather than alphabetically. This method of arrangement brings together, at the beginning, the publications of the original or older States which have the most comprehensive and systematic series of publications. The plan adopted is to enter first that general publications of the State, if any, which mass into a volume or a series of volumes, its general public documents. The constitution or records of constitutional conventions and commissions makes the first general division. Then follow the executive and staff officers who transact the routine business of the State; the inspection boards, commissions, etc., who care for the inspection and regulation of business in the State, as insurance, mines, and railroads, or record the statistics of labor, agriculture, schools, etc.; and the institutions in which business is carried on by the State, including its schools, libraries, asylums, hospitals, prisons, etc. The judiciary is the next division, followed by the legislative, and finally the miscellaneous or special. The supplementary list covers the pre-State period, colonial or territorial, including reprints or collections of documents. The editor, in his preface, recognizes the assistance rendered by Miss Frances B. Hawley, in the preparation of this list.

NOTES.

Report of the Director of the Twelfth Census to the Secretary of the Interior. 1899. Washington. Pp. 5.

Hon. William R. Merriam, Director of the Census, under date of November 1st, submits the first report of the operations of the census

office. Brief reference is made to the organization of the office and the preliminary work. The schedules for agricultural products and population have been determined upon, and the division of vital statistics is in correspondence with Boards of Health throughout the country. The manufacturing interests of the country have been grouped together in sixteen classes. A special agent has been appointed to look after the census in the Hawaiian Islands, and two special agents have been selected for the district of Alaska. A contract has been made for the lease of a building especially erected for the census office, right of purchase being reserved to the government. It is estimated that there will be required for the purpose of taking the census over 50,000 enumerators, over 2500 clerks, and over 2000 special agents. The clerical force has been apportioned to the various States and Territories on a population basis.

In the annual *Report of the United States Indian Inspector for the Indian Territory for the year ending June 30, 1899* (p. 18), an estimate is made of the total population of the Indian Territory, compiled from the records of the Dawes Commission. The estimate is as follows:—

Cherokees	84,000
Choctaws	19,000
Creeks	14,500
Chickasaws	10,500
Seminoles	8,000
Total white population	200,000
Total population	281,000

In *The Association Review*, an educational magazine published by the "Association to Promote the Teaching of Speech to the Deaf and Dumb," December, 1899, there is (p. 223) a statement in regard to the efforts made by President Bell of the Census Committee of the Association to secure proper statistics of the deaf and dumb for the Twelfth Census. The Census Committee empowered the President to communicate with the Census Bureau, and to recommend that in collecting the institutional statistics relating to the deaf, the same form of special schedule be employed that was used in the 1890 census. This card catalogue contains about 40,000, and includes details concerning all the pupils admitted to schools for the deaf from the

founding of the American School at Hartford in 1817 up to 1890. It appears from letters written by Dr. F. H. Wines of the Census Office that under the law no special census will be taken of the defective classes in 1890.

In the *Twenty-seventh Annual Report of the New York County Visiting Committee for Bellevue Hospital and Other Public Institutions*, under date of October 1, 1899, to the State Charities Aid Association, it is reported that the number of inmates in the charity department is decreasing in spite of the fact that there is a yearly increase in the total population of New York city, estimated at 3.4 per cent. This decrease is attributed to better industrial conditions and also to more careful discrimination in the admission of inmates.

There is an increase in the number of paid employees, which is partly due to the substitution of paid rates for prison labor.

In the Infants' Hospital there is a notable decrease in the death rate. The death rate among the various classes of children for the years ending October 1, 1896, 1897, 1898, 1899, has been as follows:—

	1896. Per cent.	1897. Per cent.	1898. Per cent.	1899. Per cent.
Foundlings	78	80	63	43
"Orphans," i. e., babies, other than foundlings, received without their mothers	60	59	29	30
Children received with their mothers	14	13	06	06

It is remarked that the death rate of 1898 and 1899, as compared with the two previous years, is really somewhat less striking than the above table would indicate. The children of the wet nurses employed in the institution are, according to the system of book-keeping long in use, included among the orphan children, though they are not orphans in any real sense, being nursed by their own mothers, and their chances of life are considered better than those of any other class of children in the institution.

Report to the Legislature of New York by the Joint Committee on Taxation. January 15, 1900. Pp. 19. Tables 6.

The Committee believes that the most practical reform lies in the direction of raising the State revenue otherwise than by direct levy

upon assessed valuations of property. In the first place, there is a difficulty in equalizing the assessed valuations of real property; secondly, it is a fundamental principle that the State should have an independent jurisdiction of taxation into which it alone may go; and thirdly, a result of separation of the State from local taxation would be the strict accountability to which local officers would be held in the field of local finance.

It was first considered possible to withdraw from local taxation, railroads, telegraph, telephones, electric companies, gas, water, and pipe line companies, banks and trust companies, and by levying upon these corporations taxes for State purposes, but its detailed consideration included objections. An interesting investigation was made as to the sums paid by such corporations in the several towns of three of the counties of the State,—Oswego, Cattaraugus, and Chenango. It was found that in the County of Oswego steam railroads alone in 1897 paid 9.03 per cent of the taxes; in the County of Cattaraugus, 11.89 per cent; and in the County of Chenango, 7.97 per cent. Statistically, this investigation is of great value. It is believed that this is the first time that the entire annual taxes paid in any county of New York have been collated, except in the City of New York, where there is but one tax.

The Committee has resolved to recommend a State tax of \$5,000,000 upon the indebtedness secured by mortgage upon corporate and individual real property, which the Committee believe will produce not less than \$10,000,000. The reasons for this recommendation are stated at length. It is consequently urged that mortgaged property should be exempted altogether from local taxation. The recommendation proceeds upon the assumption that there are \$2,000,000,000 of mortgaged indebtedness in the State. It is also proposed to levy a tax of one per cent upon the stock of national banks, State banks, and trust companies. These institutions, again, are to be relieved from local taxation.

In the *Economist* for December 9, 1899, comment is made on the report of the "Inspector General in Companies Liquidation" in regard to the extent to which insolvency prevails amongst joint stock companies in England and to the losses resulting therefrom. It appears that in 1898 there were 4653 new companies. Of these,

1742 companies on the register have gone into liquidation, and 865 companies have been removed from the registry on other grounds (abortive or defunct without liquidation). The rate of mortality was greater in 1898 than in 1897. "The fact that each year the liquidations amount to about one-third of the new registrations points clearly to a degree of rottenness amongst the number of flotations that urgently calls for immediate treatment." It is estimated that there is a total loss of over £111,800,000 resulting from company liquidations in the past five years. The Inspector General ascribes the rottenness that so largely prevails to the looseness of the law in regard to the duties of the directors.

The Bureau of Statistics of the Treasury Department calls attention to changes in the arrangement of the *Monthly Summary of Commerce and Finance*, beginning with the first volume of the fiscal year 1899-1900. By this certain information which appears likely to be useful to producers, manufactures, and exporters in the United States is brought to the opening pages of the volume with the purpose of making them more readily accessible, while the tables which are each month consulted by those interested are transferred to other pages. The tables are grouped: 1st, financial; 2nd, prices; 3rd, foreign commerce.

The *Report of the Bureau of Labor Statistics of New York for 1899* devotes considerable attention to industrial accidents. It is estimated that among the whole number of workers in the factories and shops of New York State about 700 met death during the year through accidents. This does not include fatal accidents to railway employees, this number being estimated at 210. It is further estimated that there are probably not fewer than 40,000 injuries all told sustained by the working people engaged in the manufacturing industries of the State. A special effort was made during the months of April, May, and June to secure from a selected list of factories as complete a record as possible of accidents. The number of employees covered was 452,425, not quite half the number engaged in manufacturing industries in the State. The number injured to each 1000 employed was 16.11. This rate is stated to be absurdly low when compared with German and Austrian statistics. Classifications are made of

injuries by character, and by industries, and period of disability. The total number of working days lost by 1880 injured persons was 19,557, which is a per capita average of 15 days. The statistical treatment is followed by a consideration of the legal action of the State in such matters, with a discussion of liability insurance.

ANALYSIS OF ACCOUNTS.

The following is taken from the *Minnesota Bulletin of Charities and Corrections*, December, 1899:—

The compiling of the analyzed accounts of the State Institutions, for which provisions was made by the last legislature, is proceeding satisfactorily. The Governor, as President of the State Board of Corrections and Charities, invited the Boards of Trustees, the Stewards of the various institutions, together with the State Auditor, the Public Examiner, and the Secretary of the State Board of Corrections and Charities to meet at his office and confer as to the proposed analysis. The very complete classification prepared by the Secretary of the State Board of Corrections and Charities in 1886, and adopted at a similar meeting in that year, was endorsed, with immaterial changes. Upon the motion of the Stewards, the articles that have come into general use since 1886 were added to their proper classifications and endorsed at the last meeting.

Although it materially increases their work, the Stewards of the various institutions have entered into the matter of the analysis with the spirit of thorough coöperation. It is confidently believed that they will find this analysis to be increasingly useful and an aid to the most satisfactory purchasing.

The books have been written up for four months, which perhaps is not sufficiently long to make any surprising discoveries. In fact, it did not appear to be the expectation of the Legislature that anything startling would be developed, but rather that the compilation of the analyzed accounts would enable the Governor and the Legislature, as well as the Boards and Institution Officials quickly to find in convenient, comparative form a statement of the various articles of consumption for various periods and thus lead to fuller knowledge

and perhaps to some economies. The convenience and fullness of the information is demonstrated to the evident satisfaction of the inquirers.

There seemed to be doubt in the minds of some whether these records were open to inspection. They are at all times open to the inspection of any interested citizen or official.

STATISTICS EXAMINATION.

In the *Manual of Examinations for the Classified Civil Service of the United States*, July 1, 1899, notice is given of the character of the examination for statistical field agent for the Fish Commission. Among the eight subjects is one entitled "Compilation of Statistics." The following questions indicate the character of the examination on this topic:—

On an accompanying blank sheet make a table including the following data and showing the increase or decrease, together with the per cent of increase or decrease, in the catch of each of the two varieties of fish in each of the Great Lakes for the years 1890 and 1893. Make a full heading to your table; compute percentages to one decimal place of per cent.

The yield of trout in Lake Superior in 1890 was 2,613,378 pounds; and in 1893, 4,342,122 pounds. The yield of whitefish in 1890 was 3,213,176 pounds; and in 1893, 2,769,088 pounds. The yield of trout and whitefish in Lake Michigan in 1890 was 8,864,167 pounds and 5,455,079 pounds, respectively; and in 1893, 8,216,920 pounds and 4,833,691 pounds. In 1890 Lake Huron produced 1,505,619 pounds trout and 1,004,094 pounds whitefish; and in 1893, 3,439,575 pounds trout and 1,222,687 pounds whitefish. The catch of trout in Lake Erie in 1890 and 1893 was 121,420 pounds and 203,132 pounds, respectively, and the catch of whitefish in the same years was 2,341,451 pounds and 1,292,410 pounds. In 1890 Lake Ontario yielded 41,010 pounds trout and 148,771 pounds whitefish; and in 1893, 6204 pounds trout and 45,380 pounds whitefish.

Write a discussion of not less than 300 nor more than 400 words giving an analysis of the statistics from the table prepared by you as

required by the preceding sheet, and make such comments, deductions, and observations concerning the facts presented as may seem to be appropriate.

RECORD OF BIRTHS, MARRIAGES, AND DEATHS.

The following is taken from the *Twelfth Report on the Custody and Condition of the Public Record of Parishes, Towns, and Counties in Massachusetts*. (Robert T. Swan, Commissioner.)

A number of the city and town clerks who are engaged in indexing the records of births, marriages, and deaths are supplying the omissions in the early records by including in the indexes names and facts taken from church records, and in a few instances from gravestones. Some of the committees having in charge the preparation of the records for printing have pursued the same course, in both cases the source of the information being given. This action is highly commended, as in very many cases the church records were much more carefully kept, and are more complete than the town records. This is especially true of the records of baptisms, a baptism being considered by the church members as of the greatest importance, while a return of the birth to the town clerk was apparently often a matter of chance. In some towns branches of certain families appear in the church records, while other branches of the same family, evidently not recognized as church members, do not appear. In the absence of the town record, the latter are nowhere recorded. In such cases the inscriptions on the gravestones furnish the only record.

The inscription is often the only existing record of a death, and, as the age is usually given, the year of birth, if not the day, can be obtained, thereby supplying the record of birth, as well as death. In the case of persons born in England, the age upon the gravestone often furnishes the clue to identification of a birth recorded there.

The New England Historic Genealogical Society, recognizing the importance of inscriptions on gravestones, has, through a committee, undertaken to procure copies of the inscriptions in all the graveyards in New England, on the gravestones of persons who died prior to 1842. It is the plan of the committee to have these copies deposited in the rooms of the society, which are open to the public, or, if they

are to be returned to the copyists, to have them copied into volumes. To this end, requests were sent by the committee to every city and town clerk in Massachusetts for coöperation in the work, with the result that full or partial lists have been received from volunteer copyists in many towns, and correspondence has been opened with persons in very many more from whom copies are to be expected. There are many towns, however, from which no encouragement has been received.

Realizing the value of this work in supplementing the imperfect records of births and deaths, I departed from an established rule of refusing to ask the town clerks to assist in any outside work, and appealed to them to assist in this. I would urge any one interested in genealogy or ancestry, or in the public records, to assist in any way possible, either by procuring copies of inscriptions, or by contribution or solicitation of money.

